OCTOBER 16, 1995 VOLUME 12, NUMBER 42

NetworkWorld

THE NEWSWEEKLY OF ENTERPRISE NETWORK COMPUTING

NetworkWorld TEST ALLIANCE

RAS RACE

Six remote access servers let users take their data and run. See page 41.

OpenView house divides

HP user group prez eyes IBM for enterprise mgmt.

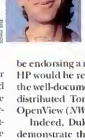
By Jim Duffy
Charlotte, N.C.

In a surprise move, the OpenView user group's president said he may veto the use of Hewlett-Packard Co.'s platform as an enterprise management system.

Paul Edmunds, Duke Power Co.'s senior IS analyst and head of the OpenView Forum, said the utility is thinking about replacing OpenView with IBM's NetView for AIX at the enterprise management level.

"The big problem is the old scalability issue," Edmunds said. "OpenView just can't handle a large network."

Should Duke go ahead with its conversion — the firm will make its decision about a month — it would be doubly embarrassing for HP. Not only would the head of the user group be endorsing a rival product, but HP would be reminded again of the well-documented delay of its distributed Tornado version of OpenView (*NW*, Jan. 23, page 1).



Duke Power found OpenView unable to handle enterprise management loads, said Paul Edmunds.

Indeed, Duke's move would demonstrate that some custom-

See Duke Power, page 14

OpenView open house

More about HP's management technology on NetworkWorld Fusion

- An interview detailing Edmunds' plans for the OpenView Forum.
- Articles on delays in Tornado.

To access: Point your Web browser at http://www.nwfusion.com, select News+, then The Front Page.

Also, here comes Spectrum 4.0

Cabletron to upgrade its enterprise management platform. See page 8.

Locking up 'Net copyrights

IBM, Novell to push 'secure containers' as on-line cash registers for electronic publishers.

By Kevin Fogarty, Michael Cooney and Ellen Messmer
Sunnyvale, Calif

IBM, Novell, Inc. and a host of electronic publishing tool vendors are scrambling to develop technology that will help companies distribute copyrighted material over the Internet without getting ripped off.

The companies will air at Internet World in Boston this month separate but related products that take advantage of a new security approach called secure containers. The technology protects the copyright of electronic text, video or sound files no matter how many hands they pass through.

IBM is leading secure container vendors in a standards effort that would make the technology more widely available. Novell is cooperating in that effort and will offer the technology in its upcoming World-Wide Web server.

While it will be three to five years before the technology is common enough to have a real impact, secure containers provide a more practical electronic commerce model than what exists now, according to Robert Weber, principal of Northeast Consulting Resources, Inc. in Boston.

Publishers are champing at the bit for a way to sell their products electronically without giving them away, said Sam Howe, director of technology strategy at Simon & Schuster, Inc.

"Today, you don't have a means to protect electronic content from being used in an unauthorized manner, which usually means republication or redistribution," Howe said. "The peo-

See Copyrights, page 66

Server evolution

Compaq to widen network reach

By Jodi Cohen and Kevin Fogarty
Houston

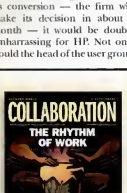
Compaq Computer Corp. hopes to change from a seller of boxes into a full-service network equipment shop.

The company this week will announce plans to:

- License Tandem Computers, Inc.'s ServerNet architecture, which uses an ASIC chip rather than a bus to route packets at ultra high speed among server components.
- Add clustering to its server line.
- Unveil a strategy for integrating networking capabilities, such as hubbing, switching and routing, into its servers and boosting performance in those systems using Intel Corp.'s P6 chip.
- Use clustering software from Digital Equipment Corp. (see story, page 14).

The company will air its plans at its Innovate Forum 95 techni-

See Compaq, page 67



Is your team doing the rumba while you're trying to teach them the mambo? Workflow tools let you tune the business beat to gain speed and flexibility. See *Collaboration*. Follows page 36.

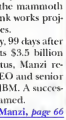
Manzi splits; will it be Lotus without him?

By Doug Barney
Cambridge, Mass.

To compare Lotus Development Corp.'s Jim Manzi to Rush Limbaugh would be a gross, but not total, exaggeration. With both men, it seems you're either for them or against them.

The fact is, the verdict on Manzi's near-13-year tenure at Lotus is dividedly mixed.

To some, Manzi was a smirky businessman out of place in the world of technology, flailing helplessly to keep Lotus strong. To others, he was a crafty master of the deal, a nonechical person who in the late 1990s saw past bits and bytes to discover the mammoth potential of a skunk works project now called Notes.



Manzi walks away from Lotus, *but with $78 million in his pocket from the IBM deal.*

Last Wednesday, 99 days after IBM completed its $3.5 billion acquisition of Lotus, Manzi resigned as Lotus CEO and senior vice president of IBM. A successor has not been named.

See Manzi, page 66

Sign of the times

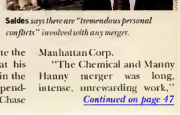
Big mergers take a human toll

Corporate culture, personnel issues transcend technology hurdles in uniting nets and employees.

By Charles Bruno

With 14 years and one mega-merger under his belt, Chemical Bank Corp.'s Paul Seldes has thrown in the towel.

Seldes, technology director for the bank's risk management group and a survivor of its merger with Manufacturer's Hanover Trust Co. three years back, resigned little more than a week ago. That was despite the relatively good odds that his job would remain intact in the face of Chemical's impending merger with The Chase Manhattan Corp.



Seldes *says there are "tremendous personal conflicts" involved with any merger.*

"The Chemical and Manny Hanny merger was long, intense, unrewarding work,"

Continued on page 47

Access Network World Fusion using the number in yellow. See page 5 for details.

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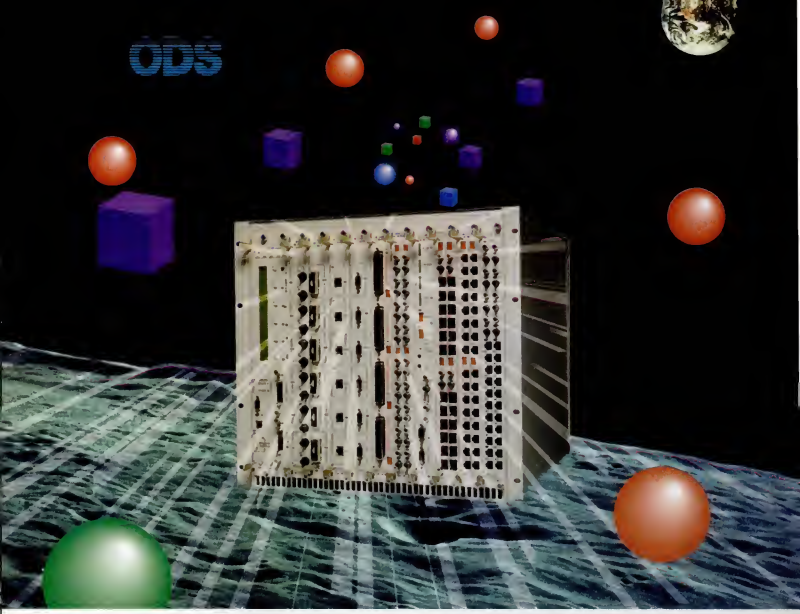

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News+

The Front Page:

- Compare different approaches to secure electronic commerce.
- Bone up on IBM's plans for Notes.

The Technical Sections:

- See how hackers could use IP spoofing to disrupt Internet transactions in Electronic Commerce
- Learn more than you ever wanted to about DCE in Local Networks.

Forum

Your side: Mana's gone. Are you sorry? Speak out in nwfusion.talk.

NetRef

Plan your life around our new networking calendar, which lists trade shows and conferences for the coming year. Get detailed info on several impending conferences.

this week's pick

Got an AS/400 in your net? Take a virtual trip to Hong Kong for Man Hui's AS/400 page. It has links to everything AS/400, including user groups, mailing lists and third-party middleware and applications vendors. Point your browser at http://www.hk.super.net/~manhui/as400.html.

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NetworkWorld

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NetworkWorld's *Mission: To provide news and analysis that help network IS professionals deliver the network computing infrastructure and distributed applications required to meet evolving business needs.*

News briefs, October 16, 1995

The copier's connected to the . . .

■ Xerox Corp. last week unveiled its Document Centre product line for managing electronic documents from the desktop. The offerings include printer/copiers that can be tied into a LAN as well as PC-based software called CenterWare that lets users access the machines. Xerox will also share APIs to encourage third-party vendors to build applications that exploit Document Centre's capabilities. Pricing for workgroup and department configurations starts at $19,495.

NYNEX and friends

■ NYNEX Corp., IBM and other vendors last week announced that they will team up to manage networks in the NYNEX region all the way down to the desktop starting this spring. The regional Bell operating company listed five other services it will offer over its network before the end of next year, as well: managed groupware; industry-specific software applications; Internet access software and browsers; a remote access provisioning service; and network integration planning and implementation. NYNEX President Richard Jalkut bundled the announcements under the name Impower.

Jalkut

President Bill vs. the science bill

■ President Bill Clinton last week threatened to veto H.R. 2405, the Omnibus Civilian Science Authorization Act of 1995. The bill calls for an end to the Advanced Technology Program favored by Democrats and cuts the National Institute of Standards and Technology's budget by 67%, to $338 million. Under the bill, the High Performance Computing and Communications Program also takes a hit, getting reduced by 50%, to $35 million.

IBM gets the picture

■ IBM last week announced that it will resell PictureTel Corp.'s line of videoconferencing systems, and, in return, PictureTel will port its PCS 50 desktop videoconferencing system to IBM's OS/2 Warp operating system. The agreement includes customer consulting and design services, too.

Which way did they go?

■ US WEST, Inc.'s deal with Microsoft Corp. to deliver a set of electronic commerce services (see story, page 17) came as a blow to Novell, Inc., which had been counting on US WEST to be the second domestic carrier to support its NetWare Connect Service (NCS). Novell and AT&T are building NCS, a public IPX-based network.

US WEST was expected to announce an NCS alliance late this year, but that deal has now apparently soured. "They've gone with Microsoft. We're not closing any doors, but any plans would have to be on hold," a Novell spokesperson said.

BBN gets defensive about routing

■ Bolt Beranek and Newman, Inc. (BBN) last week said it was awarded a $4.8 million contract by the Department of Defense's Advanced Research Projects Agency to develop a prototype 50G bit/sec IP router for Internet and military applications. The prototype, which will be delivered in late 1997, is 25 times faster than commercially available routers, BBN said.

The contract has options that could increase its value by another $2.1 million.

Chip 'n dip

■ MicroUnity Systems Engineering, Inc. last week unveiled a chip architecture that could pave the way for a new breed of inexpensive but powerful software-based networking products. MediaProcessor is the first chip designed specifically for broadband communications and multimedia applications, said Tony Stelliga, MicroUnity's vice president of marketing.

The processor will be ready for early development by the middle of next year, with general production scheduled for early 1997.

Will carriers cut corners to compete more quickly?

By Joanie Wexler

As deregulation's competitive spirit invades telecommunications markets around the globe, some observers wonder if the service levels that U.S.-based companies have come to expect might actually slack off in the short term.

The worry is that players racing to build new infrastructures and get services to market will cut operational corners.

This situation is most likely to occur in three key areas:

■ Forthcoming local-loop competition in the U.S., where customers have already witnessed some degradation of basic telephone service from certain regional Bell operating companies scrambling to expand into new multimedia and other markets (*NW*, Aug. 7, page 1).

User homework

When looking into the service potential of a new player, Tom Jones, president of New Venture Directions, Inc., suggests the following:

- Check out the capital the carrier has available to invest in tools, equipment, people and partnerships.
- Ask the carrier about the network's redundancy scheme. Is there a single point of failure anywhere in the net?
- Keep a few lines around from your former service provider and evaluate the new player's quality of service for six months to a year.

■ The U.S. wireless arena, where a frenzy to launch services looms from new Personal Communications Services (PCS) spectrum licensees.

■ Developing foreign countries, where the clock is ticking to simply get network capacity in place.

In the local loop, "there is no doubt that over the next 10 years, overall network reliability levels will trend downward," said Robert Rosenberg, president of The Insight Research Corp., a research and consulting firm in Livingston, N.J.

The reason? "You cannot take 99.9% network uptime and do much better; you can only degrade from there" as network operators' economic incentives change, he said.

Moving away from a monopolistic model in the local loop and from wireless duopolies means that network service providers' focus will soon be on turning in short-term profits to please Wall Street. This contrasts with the monopoly mentality of building gold-plated nets to last 20 years with no economic incentive to hold down costs, he explained.

The good news is that the pervasiveness of digital technology, fiber optics and savvy equipment suppliers will cancel out many reliability worries, said Tom Jones, president of New Venture Directions, Inc., a consulting firm in McLean, Va.

New providers are deploying these technologies plus distributed management systems and databases from the get-go, rather than having to transition legacy, mainframe-based systems to handle new services, Rosenberg said.

And new players can rely on equipment providers to help. Hewlett-Packard Co., for instance, recently said it is getting into the network synchronization business with a technology it calls SmartClock.

In one SmartClock application, HP intends to inject an added layer of reliability into new PCS networks by inexpensively bringing the timing reliability of cesium clocks to all ties of new wireless nets, explained Marty Neil, director of HP's Santa Clara, Calif., division. ■

Long-distance carrier says it gets bad service from US WEST

By Tim Greene
Washington, D.C.

Long-distance carrier LCI International, Inc. last week filed a discrimination complaint with the Department of Justice against US WEST, Inc. saying the carrier failed to meet court-ordered federal requirements for local connection services.

In particular, LCI said US WEST took too long to establish local-loop connections linking LCI customers to its network points of presence. LCI also said US WEST routed the long-distance calls of LCI customers to other long-distance carriers.

US WEST acknowledged that it had problems with the quality of service it delivered to LCI but denied that meant US WEST was discriminating against LCI to hurt LCI's ability to compete against other interexchange carriers.

Besides calling for those problems to be rectified, LCI sought to block Justice Department approval of US WEST's bid to enter the long-distance market, but it was too late. Last week, the department recommended approval of the US WEST plan before it had the chance to review LCI's complaint.

It approved by U.S. District Judge Harold Greene, who oversees the court order that dictates what businesses the regional Bell operating companies are allowed to pursue, the plan would let US WEST sell long-distance service to customers outside its 14-state area. Those customers would also have to buy local service from US WEST in those remote locations.

US WEST blamed the problems it had servicing LCI on growing pains. "Our service response to LCI may have been less than they expected — and certainly less than what we like to provide our customers," the carrier said in a statement.

Over the past year, US WEST has run afoul of users and public utility commissions throughout its territory (*NW*, Aug. 7, page 1). It has also been charged with discriminatory behavior by ICG Access Services, Inc., a competitive access provider in Englewood, Colo.

A spokesman for US WEST said the carrier would not discuss the specifics of LCI's complaints, which are extensive.

Among the issues were that, due to an error by a US WEST technician, 4,000 LCI customers in Denver lost access to LCI service for as long as 10 days. US WEST blamed it on "a simple human error."

In parts of Utah and Idaho, long-distance calls by LCI customers were routed to MCI Communications Corp. due to US WEST errors. That resulted in inaccurate billing of LCI customers and overcharges that LCI had to make good on. In response to complaints about those incidents, some LCI customers were told by US WEST workers that LCI was going out of business, LCI was out of business, LCI lacked carrier lines to provide service, and that the problem was the customer's fault.

Another complaint was that some LCI customers in Colorado Springs also lost the ability to call 800 numbers. ■

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CDPD struggles to take packet radio nationwide

By Joanie Wexler
San Francisco

Now that regional Cellular Digital Packet Data (CDPD) network service deployment is on a roll, carriers are attacking the next make-or-break element of CDPD acceptance: how to take the packet radio technology nationwide.

At the CDPD Forum Conference and Exhibition here last week, the Forum's quarterly report card showed a 30% jump in coverage areas since July (see graphic).

But for users seeking the anywhere, anytime dream of wireless data, CDPD still lacks a key ingredient: service interoperability. Ameritech Cellular Services and GTE Mobilnet had the only official setup in place whereby CDPD users with one carrier as their "home" carrier could travel to another's region, use the same modem and pay the same retail price.

But GTE Mobilnet said Friday that it has struck another "visiting" agreement with key player Bell Atlantic NYNEX Mobile. Later this quarter, GTE users and those in Bell Atlantic's Connecticut market will be able to visit each other's areas seamlessly, said Jay Sheth, GTE's director of wireless data.

The rest of Bell Atlantic territories will come up in 1996.

Overall, though, service interoperability is rudimentary. Even in the Ameritech and GTE setup, automated billing processes are not in place yet, partly because a CDPD Forum spec that would allow vendors to build billing systems for the exchange of usage detail is not yet complete, said Robert Walsh, chairman of the Forum's billing committee and manager of wireless data operations at Ameritech. The spec is due late this month.

Sheth predicted that fourth-quarter 1995 will be remembered as "the quarter for CDPD interoperability agreements."

Still, users who have been frustrated by coverage holes even with established, nationwide players such as ARDIS Co. and RAM Mobile Data, Inc. are not likely to see ubiquitous, nationwide CDPD service for at least another year, according to Roberta Wiggins, director of wireless and mobile communications at The Yankee Group, a consulting firm in Boston.

While Wiggins said she is bullish about CDPD in the long run, "its biggest problem is that it is not a single-vendor solution," she said.

Ameritech said it intends to have two more bilateral agreements in place by year-end and to have about 40% of the nation covered in first-quarter 1996. But one pending arrangement is with AT&T Wireless Services, which falls under regulatory restrictions mandating equal access to long-distance carriers.

These issues could hold up actual deployment, said Derek Podolsky, Ameritech manager of wireless data applications.

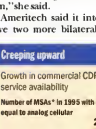
What's the sticking point?

There are reasons behind the lag of interoperability agreements. First, most carriers are preoccupied with getting services up in their own licensed regions and are also scurrying to get their systems converted to CDPD Version 1.1. Tom Trinneer, director of systems engineering at AT&T Wireless Services, said AT&T Wireless intends to have some interoperability arrangements in place during the first half of next year. He acknowledged that AT&T Wireless customers worry first about the survivability of CDPD technology — which, in his view, "has been proven hands down" — and second about its ability to stitch together its services with others into a national offering. ■

Creeping upward

Growth in commercial CDPD service availability

Number of MSAs* in 1995 with coverage equal to analog cellular



* Metropolitan Statistical Area – one of 306 of the nation's largest urban populations, as defined by the U.S. government.

Security First 'Net banks on on-line account service

By Ellen Messmer
Atlanta

Security First Network Bank this week is opening its doors as the first Internet bank to offer customers full-service checking and banking services, even as industry fears about Internet security continue to escalate.

Security First is a chartered bank business without brick-and-mortar branch offices, and its founders are confident that Internet users will flock to an electronic bank that is always open and has no lines.

Customers can make automated funds transfer deposits, pay bills and reconcile their accounts, said James Mahan, the bank's chairman and chief executive officer. Security First plans to offer services, such as corporate cash management and brokerage, in the future.

Wachovia Corp. and Huntington Bancshares, Inc. have invested $5 million to fund Security First, and bank accounts established there will be insured.

Bill Randall, Huntington Bancshares director of marketing and strategic planning, said Security First does not yet have customers, but thousands of inquiries have poured in. The bank expects to start receiving applications for accounts this week.

Security First's World-Wide Web site, which is located at www.stfn.com, employs a software program called the Virtual Bank Manager, which is designed by SecureWare, Inc., a maker of trusted operating systems for Department of Defense purposes.

Web *site guides customers through virtual bank.*

Security First set up a separate company called Five Paces, Inc., which will sell Virtual Bank Manager to banks wanting to set up full-service banking on the Interet. ■

Cabletron plans to pop Spectrum 4.0 this week

Features new and enhanced distributed apps, NT support.

By Jim Duffy
Rochester, N.H.

The wait for the much-anticipated new version of Cabletron Systems, Inc.'s Spectrum management software will end this week with the official unveiling of Version 4.0.

Spectrum 4.0 is a major release of Cabletron's net and systems management platform. Among its new features — some of which have been leaked to the public over the past several months (*NW*, May 15, page 1; Sept. 18, page 1) — are Windows NT support, new and enhanced distributed applications, fault tolerance and the ability to link several management servers into a single logical server for enterprise-wide control.

"It's going to be an interesting platform because [with the NT support], you can distribute a lot more servers at about half the price of what you'd spend for Unix workstations," said Tim Wilson, senior consultant at Decisys, Inc. in Herndon, Va. "You'll get a very scalable network management system that uses the same capabilities that corporate users are used to having in NT."

Microsoft Corp. — through its acquisition of Network Managers, Inc. technology — already offers an NT-based network management system, and Digital Equipment Corp. plans to ship one later this year.

Cabletron confirmed that it will announce Spectrum 4.0 this week but declined to comment on product details.

But sources said that, in addition to NT support, Spectrum 4.0 features a wealth of new and enhanced network management applications. Chief among them are Distributed Alarm View, Spectrum Alarm Notification Manager, Distributed Data Manager, Distributed Process Manager and SpectroWatch.

Distributed Alarm View enables users to filter, sort, select and view alarms based on multiple customizable parameters. Spectrum Alarm Notification Manager allows users to establish policies with which to filter and integrate alarms across multiple Spectrum servers.

Distributed Data Manager retrieves data from multiple server databases via a single request. Distributed Process Manager allows users to delegate management tasks to specific network operators, sources said.

SpectroWatch allows users to view more detailed information about specific network devices. It has been enhanced in 4.0 with a new user interface, increased performance, and the ability to return more timely and accurate information.

The fault-tolerance feature of Spectrum 4.0 enables users to back up a Spectrum server with another server in the event of an outage. IBM offers this in Net-View for AIX. Hewlett-Packard Co. has this for systems management in OperationsCenter 2.0.

The ability to view several local and remote Spectrum servers as one will allow customers to seamlessly access management applications and services no matter where they reside. Other features of Spectrum 4.0 are enhanced user administration tools, the ability to monitor network links, enhanced fault isolation, secure links between Spectrum servers, support for Oracle Corp. databases, case-based reasoning, and upgraded configuration and scheduling services.

Spectrum 4.0 is expected to ship early next year. Pricing was not available at press time.

✆Cabletron: (603) 332-9400.

The breadth of Spectrum

Version 4.0 features include:

- Extended operating system support, including Windows NT
- Nine new or enhanced distributed applications
- Live links
- Fault tolerance
- Case-based reasoning tool
- Enhanced data exporting capability
- User administration and user editor
- Fault isolation
- Secure Virtual Network Machine
- Dynamic icon labels for zoomed views
- Command-line interface
- Enhanced Remedy Action Request System **gateway**

COMMENTS?

See "How to reach us" on page 5.

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Group to forge data warehouse standards

By Barb Cole
Phoenix

Several vendors that sell software for building data warehouses formed an industry group last week, airing plans to develop interoperability standards for moving information among their products.

The Metadata Council by the end of the year expects to hammer out technical guidelines that will help users tackle the growing problem of managing metadata stored in several places and formats within data warehouses. Metadata is the information used to track the contents of a data warehouse.

COUNCIL MEMBERS

- Arbor Software
- Business Objects
- Cognos
- Evolutionary Technologies
- Platinum Technology
- Texas Instruments

Several other vendors, including database giants Sybase and Informix, and client/server applications maker PeopleSoft, are expected to sign on soon.

An ambitious plan

1995

July 1995
Formative meetings of Metadata Council are held.

October 1995
Metadata Council is officially formed and a white paper is issued that outlines plans to publish a framework for sharing metadata between products.

1996

December 1995
Council plans to introduce a proposal for a metadata interchange standard.

December 1996
Data warehousing products that support the interchange framework model should start to roll out.

Data warehouses glean information from multiple sources scattered across a network and pull it into a centralized storehouse. End users access the storehouse with decision-support tools.

The council will focus on developing a standard for how metadata may be shared between products across a net and an API that lets users trigger the sharing of such information. Council members stressed, however, that the group is not trying to develop a common method for storing metadata.

"We're not trying to come up with the ultimate meta-model," said Katherine Hammer, council co-chairwoman and president of Evolutionary Technologies, Inc., a founding member of the group. "We don't want this effort to become a religious war," she said.

Users attending a data warehousing conference here, where the council was launched, said the issue of metadata management is real.

"We have the [metadata] for our warehouse on the mainframe in a [Platinum Technology, Inc. Platinum Repository], and we have to download the data as a text file in order to use the information in our [Microsoft] Access and Visual Basic development tools," said Pat Langhans, a systems analyst at The Boeing Co. in Seattle. Moving the information directly from the mainframe to the client/server tools would save a lot of time, she added.

Changes made to the metadata at the tool level would be transferable to the mainframe repository, Langhans said.

Analysts applauded the council's efforts but pointed out that developing a common interface among products can be difficult.

"It's a great idea, but vendors will find it difficult to pull off," said John Zachman, president of Zachman International, a La Canada, Calif., consultancy specializing in data warehouses.■

Microsoft Internet security specification gains support

By Peggy Watt
Campbell, Calif.

Microsoft Corp. last week revealed new details about a technology it is promoting as a standard for conducting secure electronic commerce transactions over the Internet.

At an informal briefing for potential supporters, Microsoft discussed its Private Communication Technology (PCT) specification and pushed for its adoption over Netscape Communications Corp.'s Secure Sockets Layer (SSL) technology. The briefing came in the wake of Microsoft several weeks back outlining a grand scheme to become a major player in the Internet (*NW*, Oct. 2, page 1).

It appears that the Microsoft technology, which has some observers worried about a clash of standards, is already gaining momentum.

One supporter, NetManage, Inc., expects to post on its World-Wide Web site this week an API called WinPCT that is designed to encourage developers to build PCT-compliant applications.

Another supporter, Intel Corp., is crafting a technology that will make it easier for developers to build applications based on the emerging WinSock 2.0 specification that can also take advantage of PCT security.

Stardust Technologies, Inc., meanwhile, will hold the WinPCT code and offer an interoperability test site.

PCT technology provides encryption and authentication between a Web browser and server. It complements the Secure Transaction Technology (STT) introduced recently by Microsoft along with PCT. STT maintains data encrypted by PCT into the banking network.

Inquiring minds

Among attendees at an informal briefing last week by Microsoft on the PCT technical spec were:

- Cylink
- FTP Software
- Intel
- NetManage
- Persoft
- RSA Data Security
- Spry
- Stardust Technologies
- SunSoft
- SurfWatch
- Walker Richer & Quinn

While NetManage and other vendors have expressed interest in and support for PCT, they hope SSL and PCT can be integrated to form a single standard.

Netscape has made no comment on Microsoft's proposed security specification or on the potential rivalry or union of the two specs. But combining the two would essentially mean adopting PCT since it is a superset of SSL. SSL has come under fire in recent weeks for flaws in its authorization security technology.

PCT comprises authentication, encryption and certification functions. It is based on SSL 3.0 but is not entirely compatible because Microsoft added some functionality.

Microsoft's changes include improved key derivation, stronger security negotiations and a lower number of necessary handshake rounds.

The spec has been posted on Microsoft's Web site.

Microsoft's first implementation of PCT is in Explorer 2.0, a browser announced last month.■

FCC proposes charges for vanity numbers

By David Rohde
Washington, D.C.

The owner of a number like 1-800-FLOWERS will not have to fear losing that important marketing tool during the move over to 888, at least if a Federal Communications Commission proposal is approved.

But those with so-called vanity 800 numbers might consider bucking up their call center and telecommunications budgets, because the proposed FCC protection may cost money.

Following an unusually large number of pleas from users, the commission earlier this month requested comment on a proposal that holders of 800 vanity numbers be given the right of first refusal on the identical 888 numbers.

The FCC was considering assessing a fee for each 888 number selected in this fashion — either a flat fee or one determined through competitive bidding.

In the Oct. 5 notice of the proposed rule-making, the commissioners said they would probably have to use some mechanism to avoid a wholesale rush to reserve 888 numbers from holders of the more than 7 million currently assigned 800 numbers.

The proposal states: "If a significant fraction of 800-number holders wanted the 888 analogue, there would be an array of numbers immediately reserved, bringing the new code that much closer to exhaust." In such a case, the industry would have to open the next anticipated toll-free code — 877.

Dozens of users — ranging from Government Employees Insurance Co. to Barnett Banks, Inc. to 1-800-FLOWERS, Inc. — recently wrote top FCC officials asking for protection for their 800 numbers so a holder of a number such as 1-800-THE-CARD is not forced to see a competitor grab 1-888-THE-CARD.

A right of first refusal is not a foregone conclusion. In an alternative solution, the FCC said it

See FCC, page 67

Microsoft zaps the SMS bug

By Peggy Watt
Redmond, Wash.

Microsoft Corp. last week said it has begun shipping a bug fix upgrade for Systems Management Server (SMS) 1.1, resolving display resolution problems identified by an internal test team.

Screen resolution was found to be poor when an administrator viewed Windows 95 clients through the SMS help desk functions, said Collins Hemingway, director of industry marketing for business systems at Microsoft.

"As far as we know, no customer has come across the problem," he said.

FIXER UPPER

Users can download the SMS bug fix from Microsoft's CompuServe forum (GO MICROSOFT) or Web site (http://www.microsoft.com).

Microsoft is not renumbering the SMS upgrade to note the fix. SMS users can check the "About" box in the system administrator program to see whether they have the latest release, which is dated October 1995.

SMS 1.1 shipped in August, just before the release of Windows 95. The management system had been updated primarily to accommodate Windows 95 clients.

SMS is part of the Windows NT-based BackOffice suite of server applications. It provides software distribution and installation functions, application auditing and reporting tools, and a variety of local and remote control administration functions.

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Praxis readies tool for data warehousing

By Barb Cole
Framingham, Mass.
Praxis International, Inc. plans to bolster its new cross-database replication tools with a data warehouse package for storing information collected from multiple sources across a network.

Company officials last week confirmed that Praxis is beta-testing software designed to house several flavors of relational data in a common format that end users can query via decision-support applications.

The software will differ from existing data warehouse offerings in that it will store data in a hybrid of the traditional SQL format.

The read-only database, which is dubbed OmniWarehouse, will rely on the company's existing replication tools, which let users copy and convert data between Oracle Corp., Sybase, Inc. and other databases.

Russell Donovan, director of marketing at Praxis, said the software will differ from existing data warehouse offerings in that it will store data in a hybrid of the traditional SQL format and the multidimensional structures that let users perform more sophisticated data analysis.

This will enable users to move data in and out of the warehouse using the company's SQL-based replication tools but still perform multidimensional analysis of data, Donovan said.

Typically, multidimensional databases store information in a proprietary format not easily integrated with data from relational systems. End users can view summaries stored in the multidimensional data format but must return to the relational database to get more detailed information.

OmniWarehouse will also include advanced indexes and file segmenting to enable fast data retrieval, Donovan said.

The Unix-based software is expected to ship in the first quarter of next year. Pricing information was unavailable.

Users said a server primed for decision-support applications could complement the Praxis replication products.

"We are definitely looking for end-to-end warehousing products that include data movement and analysis," said Arvind Donde, a database administrator at US WEST, Inc. in Denver. Donde, who was unfamiliar with the Praxis plan, said US WEST is considering building a data warehouse based on its corporate standard Oracle database.

"It's not a requirement that our warehouse come from our database company," he said.

Analysts said the Praxis approach to warehousing is compelling because it relies on the firm's OmniReplicator tools for heterogeneous data movement.

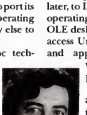
"Most of the database vendors are touting high-performance features as the solution to the data warehousing problem. But these technologies don't constitute an appropriate solution" because they do not address the issue of data movement, said Steve Hendrick, an analyst at International Data Corp., a market research firm here.

Indeed, the relational database vendors have thus far attacked the data warehouse issue by trying to eke out better performance from their database software through query accelerators or support for parallel processing hardware. ■

OLE gains ground in Unix world as OpenDoc falters

By John Cox
Microsoft Corp. last week announced an easy way to port its OLE to non-Microsoft operating systems — get somebody else to do it.

Meanwhile, OpenDoc technology from Novell, Inc. and others seems to be faltering. Novell officials did not return phone calls about its work to bring the OpenDoc component software environment to Windows platforms. Beta testers of the software said they have heard nothing from Novell in months. And Novell's newly appointed OpenDoc program director left the firm last Thursday to start a new company, after only a couple of months on the job.



MacSwain says *Software AG will incorporate OLE into its strategy.*

As part of last week's announcement, Software AG pledged to spend roughly $10 million over the next three years to port the still-undefined Network OLE technology to various Unix operating systems and, later, to IBM's MVS and OS/400 operating systems. The result: OLE desktop applications could access Unix- or host-based data and applications as if they were locally resident programs.

"Software AG will adopt OLE as its strategic object model," said Dave MacSwain, senior vice president for marketing and technology at Software AG of North America, Inc. in Reston, Va.

But don't get excited just yet. The first releases will not see daylight until the first half of 1997, as many as 20 months from now. And Microsoft still has not decided on which of several Network OLE draft specifications it will standardize, acknowledged Dan Neault, senior product manager of enterprise development marketing for Microsoft. "We're very active in this area," he said. "[A decision] is near fruition."

Software AG will also use OLE as the access point for its Adabase relational database manager and will support OLE in its Natural fourth-generation language application development environment and in its Entire communications middleware product.

Pump it up

Microsoft has pumped up the volume about OLE with the release of the object-centric Windows 95. And last spring, it raised eyebrows with a high-level description of OLE as a distributed object infrastructure, even though nearly all the essential elements of that infrastructure are not yet specified, let alone being commercially available.

Meanwhile, the alternative component software technology, OpenDoc, may be heading for the scrap heap at Novell, which bought into OpenDoc when it acquired WordPerfect Corp. several years ago. OpenDoc was designed by Component Integration Laboratories, Inc., a joint effort by IBM, Apple Computer, Inc. and WordPerfect (later bought by Novell) to create a networked compound doc-

See **OLE,** *page 14*

IBM looks to boost LAN links and management

By Michael Cooney
Raleigh, N.C.
IBM this week will roll out a collection of products to provide users with less expensive and more extensive LAN-to-host connectivity.

Among the new offerings is a more powerful version of the 3172 Interconnect Controller, IBM's LAN-to-mainframe gateway, and improved TCP/IP routing capabilities for the company's 3172 Model 390 for NCP Multinetwork Server gateway.

In addition, IBM has improved LAN management capabilities for its NetView Multisystem Manager package.

Analysts said the announcements are designed to help large IBM mainframe users better handle the increasing amount of LAN and TCP/IP traffic coming into the mainframe.

A new edition of IBM's 3172 Model 3 gateway will support twice as many host connections as the earlier version.

Rather than featuring one dual-slot Enterprise Systems Connection (ESCON) adapter for 16 high-speed host links, the revised gateway can handle two single-slot ESCON adapters that can each hook up 16 hosts at either 10M or 17M byte/sec. The additional ESCON connections give users the luxury of being able to establish a number of backup links.

With ESCON, customers can connect to more hosts from an enhanced 3172 Model 3, and the ESCON adapters cost less. The single-slot adapters are priced at $9,500, whereas the dual-slot one costs $16,000.

More power, more money

Those cost savings could be offset, however, if customers take IBM up on a 90-MHz Pentium processor upgrade now being offered. The processor would replace the 66-MHz processor, priced at $5,990, that is currently used in the 3172.

"Clearly, by reducing the price and increasing the power, IBM is trying to make the 3172 the high-speed conduit of choice for attaching LANs to mainframes," said Frank Dzubeck, president of Communications Network Architects, Inc. in Washington, D.C.

All of the new equipment will be available Nov. 17.

The biggest enhancement to IBM's other gateway, the 3172-390, is new TCP/IP routing support. While the device previously could handle TCP/IP routing, now it can completely take that chore off the hands of customers' 3745 front-end processors.

The 3172-390 is designed to attach to remote or local 3745s and off-load SNA and TCP/IP session setup processing from a central-site mainframe (*NW,* March 13, page 6). The 3172-390 is outfitted with an IBM P/390 mainframe on a board and linked to a 3745 by either an IBM Token-Ring or direct Synchronous Data Link Control line.

The idea behind the product is to give users one fewer reason to migrate remote 3745s to routers or other boxes.

In that vein, the company will add improved support for TCP/IP's Routing Information Protocol (RIP) to the 3172-390. RIP processing can now be done on the gateway, freeing up cycles on the 3745, which currently handles RIP processing.

"The box is an anomaly that will find a home in few SNA nets," said Anura Guruge, an independent analyst based in New Ipswich, N.H. "The 3746-950 and other boxes are more capable of handling the 3172-390's job."

The IBM 3746-950 is a stand-alone processor and follow-on box for IBM's 3745 that can handle TCP/IP, Advanced Peer-to-Peer Networking and other communications functions.

Performance hike

In addition to the new routing support, IBM is giving the 3172-390 a performance boost via a 90-MHz Pentium processor upgrade.

For managing LANs linked to the mainframe, IBM will announce NetView Multisystem Manager Version 2 Release 2.

The new package can monitor LAN Network Manager (LNM) 2.0 devices, such as IBM Token-Ring bridges and controlled access units.

NetView Multisystem Manager runs on top of NetView and gathers topology and status data from SNA, TCP/IP, LNM or Novell, Inc. NetWare nets. It then automatically builds objects representing those resources for storage in IBM's object-oriented management database, Resource Object Data Manager.

"IBM has a huge installed base of LNMs so it needed to tie them into the Multisystem Manager so users could centralize all their LAN activities," Dzubeck said. ■

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Microsoft lays out Windows NT clustering support plans

By Peggy Watt
Redmond, Wash.
Microsoft Corp. is stretching its Windows NT network operating system to embrace another enterprise function by partnering with hardware vendors to deliver server clustering technology.

Support for clustering, in which multiple servers share a net load and back up each other, would enhance Windows NT's ability to support mission-critical applications that companies cannot afford to have go down.

Microsoft wants to differentiate its clustering support from that available from most server vendors by providing software-only — not proprietary hardware — connections, said Mike Nash, Windows NT Server group product manager.

The first effort toward that end will be a design preview meeting sometime in the first half of 1996 for interested hardware and software application developers, including representatives of Microsoft's own development teams for BackOffice server applications.

Microsoft expects to initially deliver Windows NT support for a pair of servers, structured to work like disk mirroring. The

See **Clustering, page 67**

By contrast, he said, SOM/DSOM is the most popular object request broker (ORB). SOM/DSOM is based on the Object Management Group's Common ORB Architecture. And IBM has shipped 100,000 OpenDoc software development kits for OS/2, Slitz said.

In an earlier interview, Slitz said, "IBM will do whatever is necessary to continue the work we've done in OpenDoc and to establish this in the Windows environment."

What's necessary is that IBM establish OpenDoc as a viable component library and market it aggressively. Neither has been done, according to David Smith, research director for systems software at Gartner Group, Inc., a Stamford, Conn., market research company. OpenDoc's real opportunity in the Windows market, he said, lies with Lotus Development Corp., which is, in effect, IBM's PC software arm.■

Network World Fusion

Ponder the future of Network OLE on Network World Fusion. Resources include:

- Details on Network OLE's six main interfaces.
- A white paper that compares Remote Automation, a new Microsoft offering in Visual Basic, with Network OLE.
- A look at Project Eagle, Andersen Consulting's distributed-computing pilot.

To access: Point your browser at http://www.nwfusion.com. From the main menu, select News+, then Client/Server Applications.

OLE

Continued from page 12

ument architecture to run on multiple operating systems.

Like OLE, OpenDoc has been touted as a way of creating software components that can be reused easily in new applications. OpenDoc uses IBM's System Object Model (SOM)/Distributed SOM (DSOM) to define object interfaces and communicate over a network.

But Novell officials were silent about OpenDoc last month when they outlined the company's future directions and product goals. And they remain so. Senior officials, including Jeffrey Waxman, executive vice president of the Applications Group, Richard King, executive vice president of the network systems group, and Robert Frankenberg, chief executive officer, had not returned telephone calls by press time.

And last Thursday was the last day for OpenDoc Program Director Rob Bentley, who had been on the job less than two months.

While Novell remained silent, IBM loudly defended its object technology. An IBM official said the Software AG agreement simply underlines the fact that Microsoft has little experience with the realities of distributed object computing.

"I see them as saying we want smart people to come and solve this [problem] for us," said John Slitz, IBM vice president of object technologies. "You should treat them as you would anyone else who announces another alliance with no specific deliverables and a two-year development schedule."

Windows tool integrates data across apps

By John Cox
Cambridge, Mass.
Oberon Software, Inc. this week is releasing a Windows-based tool that lets developers and end users build custom programs by linking existing applications on a desktop or across a network.

The tool, called Prospero, lets users create a library of reusable building blocks for specific tasks, such as moving files or data records from a sales contact management program into Lotus Development Corp. Notes.

Prospero graphically represents an application, or a function such as accessing a database, as a box called a building block (see screen shot). Users connect the boxes with arrows, and the resulting diagram shows how and what data flows through the various applications, such as spreadsheets. The diagram builds a finished application from these reusable components, all without programmers having to write code.

"What it allows you to do is separate the front end of the application from the back-end data flow," said Brad Scheller, senior manager at International Systems Services Corp., a Stamford, Conn., management consulting company. He has been working with Prospero for about six weeks.

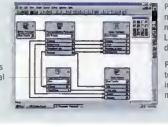
The tool set relies on the OLE Automation interfaces to open and manipulate desktop applications and the Open Database Connectivity database API to access database servers. The product is similar to Prodea Synergy from Prodea Software Corp.

Prospero is available for Windows 95, Windows NT or Windows 3.1. The price is $695 per user. There are no run-time fees.

✆Oberon: (617) 494-0990.

PROSPERO AUTOMATES DATA FLOWS

The large boxes represent applications, databases and functions, while the smaller one beneath these includes the specific data elements or fields being manipulated. Users work with a mouse to connect the boxes, then save so it could run the resulting visual program.



Duke Power

Continued from page 1

ers cannot wait until HP ships its distributed OpenView, which promises increased scalability. The software was originally scheduled to ship in mid-1995 but has been delayed until next year.

"That's just too far out," Edmunds said. "So we're looking at alternatives."

Duke it out?

The fact that Duke is even considering replacing OpenView should serve as a wake-up call for HP, according to analysts.

"IBM certainly has at least a six-month — if not a year — lead over HP," said Jill Huntington-Lee, senior analyst at Dataproo Information Services Group in Delran, N.J. "Unless HP throws some more resources at accelerating OpenView enhancements, they'll still remain six to 12 months behind IBM."

Even though HP might be the leading supplier of enterprise management platform software, "there are clear alternatives to OpenView available in the market now," said John McConnell, president of McConnell Consulting, Inc. in Boulder, Colo.

HP seems reconciled to the prospect of playing a subordinate role to NetView for AIX in what is now a pure-OpenView shop.

"Regardless of the outcome, OpenView will still be managing all of their site locations," said Gordon MacKinney, HP OpenView program manager.

Duke owns six OpenView licenses and uses the software to manage between 12,000 and 15,000 nodes, Edmunds said. Three OpenView platforms are located at three of Duke's nuclear power stations, while the others are situated at central headquarters.

Duking it out

Duke Power has ruled out replacing OpenView with Cabletron's Spectrum or SunSoft's Solstice for the following reasons:

- The learning curve is too steep.
- Major management applications have not been ported to them.
- It would require using another operating system at the management station.

Duke is looking for "an effective method of centralized network management" that would not necessitate changing OpenView licenses at the campus level, Edmunds said. Under this scenario, Duke would install a NetView for AIX system for central management and leave the HP-UX-based OpenView systems as campus managers at the nuclear power stations.

And it looks like Duke's major network management applications will port to the IBM platform, Edmunds said, so the company doesn't anticipate any snags developing there.

Still, Duke has not ruled out HP as the provider of its central management console. The utility is talking to HP about the possibility of putting OpenView on a more powerful server so it could handle multiple X Window sessions from operators stationed at Intel Corp. Pentium-based Windows NT workstations.

"We really want to have one view of our network that can be accessed by multiple operators," Edmunds said. "That requires a fair amount of memory. The particular workstations we have now is maxed out at 400M bytes of RAM which cannot support as many X users as we'd like to. We're talking to HP and they're working on some appropriate solution for us right now."

Edmunds does not see the move affecting his position as president of the OpenView Forum, unless Duke changes out all of its OpenView licenses, which is unlikely but not out of the question.

"I can still be a very credible, effective proponent for our members," he said. "Having fought the battle and lost doesn't necessarily mean I still don't know anything about OpenView."■

COMMENTS?

See "How to reach us" on page 5.

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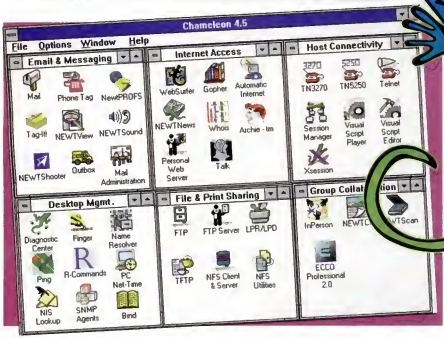

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Circle Reader Service #47

WANs & Internetworking

Covering: Network Architectures • Net Management • Mobile Computing
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Briefs

■ *The U.S. wireless industry's split preferences on digital* **cellular standards** *could leave most U.S. mobile users behind the times — at least in terms of a handy mobile package* **Hewlett-Packard Co.** *and* **Nokia Mobile Phones** *will begin selling early next year. Dubbed the OmniGo 700, the bundle swaps together an HP200LX palmtop and a Nokia GSM-based wireless phone, allowing users an integrated bug on the two items they use the most: a powerful PC (with a GSM modem) and a telephone. GSM is the digital cellular air interface of choice in Europe and the Asia-Pacific.*

Most U.S. personal communications services spectrum auction winners have fixated on other technologies, such as Time Division Multiple Access, making OmniGo a no-go in the U.S.

■ **Netrix Corp.** *last week announced it will offer* **a router card from Cisco Systems, Inc.** *to fit the Netrix 200 multifunction access switch. This enables the Netrix 200 to route TCP/IP, IPX, SNA and AppleTalk traffic, in addition to switching frame relay, X.25 packets and SNA packet assembler/disassembler traffic. The card is available with an Ethernet 10Base-T or token-ring interface.*

Netrix: (703) 742-6000.

■ **Platinum Technology, Inc.** *has unveiled help desk software that allows users to access* **problem management information over the Internet.** *Called Apriori Hands-Free, the software enables users to access problem resolution data via a World-Wide Web home page and browsers, as well as electronic mail. Hands-Free is designed to allow users to solve most network problems without having to call their company's help desk or support staff.*

Apriori Hands-Free costs $10,000. It will be available later this year.

Platinum: (708) 620-5000.

Look out world, here comes NATTA

Spin-off AT&T equipment company is already looking to complete broad product line.

By David Rohde
Basking Ridge, N.J.

Forget Cisco, Bay, Cabletron and 3Com. There's a networking equipment company that could soon have a broader product line than any of them and could dramatically alter users' internetworking choices.

Affectionately called NATTA — short for Not AT&T Anymore — by employees, it's the $20 billion communications equipment powerhouse to be spun off from AT&T's network services business in the recently announced three-way breakup of the giant company.

Get technical!
Network World Fusion
Specs for AT&T's networking products are now available on Network World Fusion. Link to http://www.nwfusion.com, select News+, then WANs and Internetworking.

Not many users realize that NATTA already has the capacity to offer routers, hubs, LAN switches, multiplexers and modems. This is in addition to its core voice offerings of private branch exchange systems for end users and central office (CO) switches for telephone companies — plus a key carrier backbone Asynchronous Transfer Mode switch.

The router and hub business comes courtesy of an agreement earlier this year between Bay Networks, Inc. and AT&T Global Business Communications Systems (GBCS) — the PBX business that will form the heart of NATTA's end-user sales force.

Suddenly magnified in importance, the deal — under which GBCS resells Bay products — was specifically made because of the breadth of Bay's product line, according to a key official in the new company.

And already the company is moving to the fill the important holes that remain in its product line, said Barry Karafin, who holds the telling title of vice president of product realization for GBCS. For example, despite the presence of the Globeview 2000 ATM switch manufactured by AT&T Network Systems — the CO switch maker that will be

See NATTA, *page 20*

US WEST picks partners for its Internet services bid

By Tim Greene
Denver

US WEST, Inc. will offer next year Internet services, including secure, virtual private networks and on-line access to Lotus Development Corp.'s Notes, to users in selected cities.

The new IP-based service, called Interact, will initially offer simple dial-up and dedicated Internet access in seven US WEST cities — Denver, Minneapolis, Omaha, Neb., Phoenix, Portland, Ore., Salt Lake City and Seattle — all by the middle of 1996.

But throughout the year, US WEST's Enterprise Networking Services group will add more offerings and then, in the following year, extend them to more cities.

The services will be offered in partnership with Microsoft Corp., Netscape Communications Corp., Lotus and Cisco Systems Inc., each of which will provide a key component to the services (AW, Oct. 2, page 1).

In addition to IP traffic, the service will provide IPX emulation and route IPX traffic from users of Novell, Inc.'s NetWare.

Security features of Microsoft NT software will authenticate users as they log on to sites on the Internet and define each user's access rights, such as read-only,

See US WEST, *page 22*

US WEST's 'Net bid

Companies can make use of Interact's Internet access, Notes service and other offerings while maintaining a VPN.

GRAPHIC BY SUSAN J. CHAMPION

Polaris pulls NetWare users into mainframe environment

By Michael Cooney
Beaverton, Ore.

Novell, Inc. NetWare users looking for high-speed communications links to SNA mainframe resources can now find relief from Polaris Communications, Inc.

The firm recently announced its System 2000 Gateway, which lets NetWare LAN users link directly to the IBM mainframe channel either via IBM's fiber-based Enterprise Systems Connection (ESCON) or traditional copper bus-and-tag links.

For mixing SNA and LAN traffic, the System 2000 gives users a less expensive alternative to products from competitors Bus-Tech, Inc. and Cabletron Systems, Inc., Polaris claimed.

"LAN users are increasingly needing quicker access to databases and other files on IBM mainframes, and the System 2000 provides high-speed integration of mainframe applications and the networked environment," said Iraj Vojdani, president of Polaris.

The System 2000 is built on a 120-MHz Pentium chip, runs NetWare for SAA Version 2.0, and supports NetWare 4.1 and 3.12 NLMs. Each System 2000 comes with seven slots that can

See Mainframe, *page 22*

A hurdle: servicing small businesses

Despite its potential, a company with a voice heritage — even one as big as AT&T's equipment spin-off — may still have trouble gaining the confidence of users when it comes to the data side. And that's just one of many hurdles the new Not AT&T Anymore (NATTA) company will face in taking on the existing powers that be in enterprise internetworking.

Unlike its rivals, NATTA is saddled with a huge base of unsophisticated and often difficult-to-handle small businesses using its telephone systems and older private branch exchanges.

These headaches provoked a Global Business Communications Systems branch office manager to tell a meeting of colleagues in field operations that users were demanding retroactive credit on maintenance bills, indemnification for loss of business and free upgrades, all because of defective products, incorrectly marked packages and shortages in shipments.

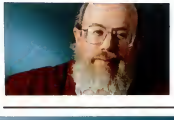
Some of these users believe AT&T people are "cordial, kind and inept," said Audrey Fields Burson, general manager of AT&T's small business district office in Newark, N.J.

Contacted by *Network World*, Burson confirmed the comments but said she was referring to a small percentage of customers.

Not all the news is bad. "I don't know that anyone matches AT&T's support and service on the equipment side," said Peter Bernstein, president of Infonautics Consulting, Inc. in Ramsey, N.J.

INTERNETWORKING MONITOR

Scott Bradner



Looking for the missing linker

Virtual networking seems to be all the rage these days.

It is hard to pick up a copy of this or any other trade magazine (but there is no reason to pick up any other) without finding a story on virtual LANs. The way many of these stories read, all of one's problems can be solved by going virtual.

VLANs, based on frame or ATM switches, can offer great advantages, particularly for organizations that often shuffle people around. Moving Fred down the hall and keeping his computer on the same LAN, or keeping him in the same office but relocating his PC to another LAN when his job is modified, can significantly reduce the pain of changes. (This is according to the seemingly omnipresent salesdroids.)

Some companies do seem to be rather restless. I was at one a few weeks ago where they said they move each person once per year, on average. Since this was a statement of the average, I kind of wonder what it's like on the wrong end of the distribution curve. Some of these cases do seem like Brownian motion being mistaken for progress.

But something is missing from too many presentations about these VLAN paradises. Somehow the need to talk between VLANs seems to be forgotten.

This is not the case with all of the presentations. The acerbically and accurately named "marketectures" put out by the companies that have routers in their blood do show that isolated VLANs are not as useful as they might be. This seems to somehow slip past those vendors coming from other backgrounds. This problem may be solved if the merger frenzy continues since there will be only three vendors of networking products left. (And I'll leave you to guess which three I think they will be.)

One would think that those who spend as much time as some of the presenters do talking about how great it is to be able to remotely assign Fred to the LAN of management's choice could understand just one more important thing.

That even though network architects have divided networks into LANs for many reasons — traffic separation, security and limiting broadcast domains being a few — most LANs do have to interact with other LANs. Having a LAN that cannot interact with other LANs is like getting Friends and Family and finding out they really mean it.

Routers are not going away in the age of VLANs. Nor is routing itself going away. People who start to put in large switched networks, without real LANs or VLANs, will rediscover why network architects moved away from large bridged networks. By the way, it is my opinion that about half of what is now marketed as Ethernet switches started life as multiport bridges but were transformed by the marketers. Amazing what electronic miracles one can work with a bit of paint.

The next time one of these eager, well-coiffured salespersons tells you the wonders of VLANs, ask him how Fred in his new virtual world will talk to Bill in another new virtual world. While you are at it, you might ask the salesperson how either of them talks to the Internet.

A couple of years ago, one of these salespersons came to tell me the wonderful things he could do for Harvard with VLANs. I asked the above question and, after a bit of tooth pulling, I was told that I should get a 200-port router, but that was outside of the virtual reality he was trying to sell me.

Disclaimer: Although some would claim otherwise, Harvard is better acquainted with real reality than with virtual reality. In any case, Harvard does not express an opinion about LAN realities.

Bradner is a consultant with Harvard University's Office of Information Technology. He can be reached via the Internet at sob@harvard.edu. He shares this space with Daniel Briere and Christine Heckart, whose column will appear next week.

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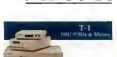

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Circle Reader Service #37

Alliances

Telecom 95 underscores 'global village' concept

By Joanie Wexler
Geneva

A feeling of global telecommunications unity swept over Telecom 95, the giant quadrennial international communications trade show that ended here last week.

Exhibiting vendors emphasized their efforts toward consistent worldwide services with common interfaces. Supporting this theme, alliance announcements ran rampant as application vendors teamed with carriers that plan to deliver value-added services by hosting those vendors' software in their networks (*NW*, Oct. 9, page 12).

In the same vein, demonstrations of Internet products and services, as well as collaborative multimedia abounded. Microsoft Corp., for instance, formed alliances with several foreign carriers for integrating The Microsoft Network and its application software, the Internet and carrier services into one sprawling information marketplace.

Wireless network providers also stuck to the goal of consistent worldwide telecommunications. GTE Corp.'s telecommunications services and wireless subsidiaries, for example, teamed with Deutsche Telekom's wireless arm to launch GlobalRoam, the world's first two-way, international wireless roaming system based on Advanced Mobile Phone Service.

The idea is for users to carry one mobile phone with them from country to country, have it work the same way in all areas and receive one bill from their home provider.

"We need to develop a one-world view in which improvements to the global communications infrastructure will reach all points of need and opportunity," said Michael Masin, GTE vice chairman, in a formal address at the show. Meanwhile, the global satellite partnership Inmarsat launched the Inmarsat Wireless Messaging Technology, based on Microsoft's Messaging API, which gives mobile users anywhere in the world access to a Microsoft Exchange Server.

The software was codeveloped by Inmarsat, Paragon Software, Ltd. and Telesis North, and it is supported by ARDIS Co., AT&T Wireless Services and Vodaphone Group. It allows electronic mail users doing business away from the office to select, say, the ARDIS driver to connect to their company's server.

If these users then move into an area served by Cellular Digital Packet Data (CDPD) but not ARDIS, for instance, they could select the CDPD driver from the pull-down menu and connect thatway. ■

Telephone troubles at Telecom 95

Suppliers at Telecom 95 espoused highfaluting goals of seamless international voice and data communications, but folks trying to make a basic telephone call from Geneve's Palexpo convention center might have appreciated getting over that simple hurdle first.

A few pay phones understood touch-tone signals; others did not. Some understood the signals except for the * and # keys, annihilating most users' chances of checking voice mail.

In general, calling cards were unusable, requiring attendees to purchase phone debit cards and talk fast while watching the meter run out before their eyes. Those who sprung for renting cellular phones traded in the touch-tone problem for a worse one: the clogging of cellular access lines, which rendered making a cellular phone call virtually impossible at peak times during the day.

NATTA

Continued from page 17

NATTA's face to the world's telephone companies — the new company cannot yet point to a premises ATM switch. "But I'd stay tuned," he said.

And shortly, the company will guide its flagship Definity PBX in new directions to reach a more unified, multimedia environment. "There will be announcements in the future that will make that clear," Karafin said.

The company has been sharing ideas with Bay, including the concepts behind the Baysis architecture, for a migration to switched virtual Internets. But he emphasized that he sees "Definity as a key element for a long time to come."

To beef up the data expertise of the GBCS team even before the breakup was announced, the division has taken staff from the service arm of AT&T Paradyne, the maker of multiplexers, modems and other data equipment, Karafin said.

And once NATTA must shoulder its own profit and loss responsibility single-handedly, its rivals might wield more of a competitive influence.

AT&T GBCS has been slow to market with some pending features for its switches, such as computer-telephone integration support and multimedia call servers, which Northern Telecom, Inc. has been aggressive with, said Ken Starkey, associate director of communications at Bear, Stearns & Company, Inc. in New York.

The brokerage uses phone switches from both AT&T and Nortel. "It's not that AT&T has been slipping; it's that Nortel has been waking up," Starkey said.

Jeff Hafer, telecommunications manager for GPU Service Corp. in Reading, Pa., shunned GBCS several years ago in favor of Nortel when it purchased PBXs because he questioned GBCS' service capabilities. But at the same time, he bought Synchronous Optical Network (SONET) fiber termination equipment from AT&T Network Systems — the organization usually serving phone companies — for a large local private network.

"I felt [AT&T Network Systems] had their act together even though they weren't really accustomed to dealing with end users," Hafer said. He added that the new combination of AT&T Network Systems, GBCS, AT&T Paradyne — in partnership with Bay — could be a big winner, even if they slim down, "assuming they wind up with the right people."

Senior Editor Joanie Wexler contributed to this story.

Powerhouse potential

The network equipment company to be spun off from AT&T includes the following units and major product offerings:

- **Global Business Communications Systems**
  PBXs, voice messaging systems, resale of Bay routers
- **AT&T Network Systems**
  Central office switches, fiber termination equipment
- **AT&T Paradyne**
  Multiplexers, modems
- **AT&T Microelectronics**
  Semiconductors, power systems
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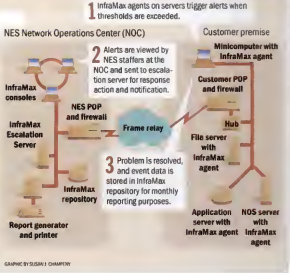

GRAPHIC BY SUSAN I. CHAMPION

NES unveils an 'intelligent' remote management service

By Jim Duffy
Waltham, Mass.

Network management service provider New England Systems (NES) last week announced a new offering that the company said optimizes the performance of enterprise networks through 24-hour on-line support.

The service, called InfraMax, combines fault monitoring, event logging and performance analysis from a single NES network operations center. InfraMax is intended to make user networks more reliable by making fault and error detection a proactive, instead of reactive, process.

The InfraMax service comprises three components: agent software, an NES Enterprise Technical Engineering Center (ETEC) and detailed reports on network performance.

The agent software resides on managed systems in the customer's premises. It monitors network performance in real time against event thresholds and triggers alarms when those thresholds are crossed.

The ETEC is staffed by NES personnel, who provide 24-hour, seven-day-a-week analysis of the customer's network and who also define and resolve problems. The ETEC serves as the customer's network control center.

The reporting capability couples trend and analysis information with recommendations for increased network reliability performance. These reports are provided to the customer on a monthly basis.

Not only is InfraMax designed to boost network uptime through proactive fault resolution, it is also intended to prevent vendor finger-pointing when problems occur in multivendor environments. In some cases, when an outage occurs, downtime follows, and a user is left to call each vendor whose product exists on the network, NES said.

More intelligent

On the surface, NES' InfraMax offering looks no different than other offerings from carriers, computer vendors and systems integrators. But analysts say InfraMax agents put more intelligence into the network, which makes management a more proactive process.

"What I wonder is whether or not some of the larger players in this market are going to be interested in this technology as part of their own tool sets," said Kitty Weldon, a research analyst at The Yankee Group in Boston. "What they have been looking for is intelligent tools to enhance the ability to do proactive monitoring of remote sites."

Although the InfraMax tools may set NES apart from other firms, the company's challenge is to establish relationships with larger players so it can propagate the InfraMax technology, Weldon said.

InfraMax is available now at a price of $250 per month per managed object.

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Mobile bigwigs build wireless nets

Norand, Racotek and RAM Mobile Data team; group announces product, service bundle.

By Joanie Wexler
Atlanta

Users will soon have a new way to quickly deploy wireless applications with a minimum of disruption to their own systems and networking staffs.

A package deal for wireless networking put together by rugedized handheld computer vendor Norand Corp., middleware mogul Racotek, Inc. and packet radio net operator RAM Mobile Data, will hit the streets this week. The package will be sold by all participating vendors.

The goal of the program, dubbed FastAccess, is to help those in vertical markets use wireless networking to better service accounts and cut operations costs. At the same time, the system hands over to someone else the headaches of getting various mobile computing components to work together, explained Michael Colwell, director of product marketing at Norand.

The first FastAccess bundle, which includes application software from Norand plus its handheld computers, is targeted at wholesalers that deliver food and beverage products directly to retail establishments. Those users are trying to keep their customers' shelves stocked and inventories reconciled.

With wireless, sales orders can be collected and transmitted as they occur in the field. Today, most orders are saved up all day and then transmitted in a bunch over a wired phone line, which creates order-taking bottlenecks, said Paul Contois, manager of IS for Pepsi-Cola Allied Bottlers, Inc. in Latham, N.Y., a distributor that has signed on for the FastAccess service.

Using the wireless "as-you-go" method has freed up the time the distributor's salespeople previously spent phoning in orders. That time can now be used for servicing customers and selling, according to Ron Cole, distribution analyst for the company. He estimated a 25% productivity gain for salespeople.

Some Norand customers are hoping to eliminate third-shift personnel. These late shifts are sometimes necessary because orders come in late in the day and employees are required to load trucks all night to uphold distributors' 24-hour delivery guarantees, Colwell said.

Other special packages from the vendor trio will follow shortly for other markets, Colwell said.

But the system includes more than just a client. Racotek supplies a server that sits at the customer premises, providing the interface between the application and the wireless network. A Racotek API also resides on the client device.

RAM provides the wireless packet network services across its Mobitex network.

The deal is not a bundle in the traditional sense, so the user will — unfortunately — still receive separate bills from each of the three vendors, including monthly airtime charges from RAM and support charges from Racotek. But RAM has designed special, fixed monthly pricing tuned to the work habits of this market (see graphic) and will design fixed-fee packages for other vertical markets.

Racotek has waived certain setup fees as part of its special pricing program and has fixed pricing at $17 per month per mobile user, which includes the "rental" of its KeyWare middleware and support services.

Such group selling and interoperability work is indicative of how many wireless applications will get deployed in the future, said Andy Seybold, a wireless consultant and editor of the "Outlook on Mobile Computing" newsletter in Boulder Creek, Calif. A multivendor sales approach should allow customers to deploy wireless applications in the field quickly "without a magician to get it to work," Seybold said.

Colwell said Norand and Racotek have tested their products with other packet radio networks, such as the ARDIS Co. network and Cellular Digital Packet Data nets, and there is "nothing about the program that precludes a customer from using other networks." ■

Predictable prices

RAM has customized its airtime pricing for the route distribution market with fixed monthly fees that decline as the number of users increases. This contrasts with RAM's standard E-mail pricing, which carries less predictable, extra-usage charges.

RAM monthly FastAccess fees

Subscribers	Up to 100K bytes	251K-300K bytes
1-100	$35	$93
101-200	$33.25	$69.75
401-500	$28	$55.80

RAM's standard monthly E-mail fees

Per user usage:	Cost
Up to 100K bytes	$25, plus 35 cents/additional kilobyte
Up to 200K bytes	$66, plus 33 cents/additional kilobyte
Up to 275K bytes	$85, plus 31 cents/additional kilobyte

Mainframe

Continued from page 17

be configured to support a variety of PCI or EISA boards and as many as two token-ring or Ethernet LAN adapters. The box can also be configured to support up to four ESCON channels.

The System 2000 looks like an IBM 3174 controller and can support a maximum of 32 SNA physical units and up to 2,000 sessions with the mainframe. Since the box runs NetWare for SAA 2.0, it can load-balance sessions from multiple downstream servers, Vojdani said. He noted that the System 2000 also supports TN3270 TCP/IP, allowing SNA users to access the mainframe over TCP/IP nets.

According to analysts, the System 2000's ESCON support gives the box a leg up on its primary competition, Bus-Tech's BT-I, which currently supports bus-and-tag connectivity to mainframe channels. Bus-Tech, however, has said it will deliver ESCON connectivity in the future. BT-I is built on a 3172 controller platform that Bus-Tech buys from IBM.

On the other hand, Bus-Tech also offers a Microsoft Corp. SNA Server version of BT-I that lets users link the Windows environment to SNA resources. Polaris indicated that it will support similar links in the future.

"The key for Polaris is all of its [hardware] technology was developed in-house; they aren't dependent on any OEM agreements that gives users one less thing to worry about," said Lynn Nye, president of NetResults, a consultancy in Portland, Ore.

The System 2000 is Polaris' first direct end-user offering. The firm previously only sold products via the OEM channel.

Pricing for the System 2000, available this month, starts at $19,000.

©Polaris: (503) 643-1533.

RealityCheck

Product:
System 2000 NetWare for SAA Gateway

Company:
Polaris Communications, Inc.

The benefits

- ▲ High-speed LAN access to mainframe resources.
- ▲ Centralized LAN administration capabilities/ fewer definitions required on the mainframe.
- ▲ Reduced workload on mainframe.

The drawbacks

- ▼ Polaris' first end-user product.
- ▼ Potential single point of failure.

The user view

"We now have the ability to do load-balancing, which we haven't been able to do with our previous systems, plus we can now support more sessions."

Dennis Martin, senior systems programmer, North Pacific

US WEST

Continued from page 17

read and write or read-write-modify-delete, according to Steve Starliper, director of network application services development at the firm.

Those features of NT will be used to establish virtual private networks (VPN), defined either by a single-user company or by several user companies that have common business interests.

Windows NT also provides directory features to search for resources common to a particular user group.

Further security will be provided by Cisco. The firm is scheduled to develop by spring encryption for IP traffic between routers within the US WEST network and on the Internet.

Cisco also provides the Cisco 7000 router platform within the US WEST network to handle the Internet connections and establish the VPNs.

US WEST will embed Lotus Notes in its network to let users outsource their Notes servers to the carrier. A user could get a secure dedicated server or, for a lower price, a shared and less secure server. Beta tests start at the end of the year, and the Lotus Notes offering will be ready for market next fall.

US WEST will offer an E-mail service supported by Microsoft Exchange.

Part of the basic Internet access service is support for X.400 and Simple Message Transport Protocols to let the permanent virtual Internet members send E-mail to one another.

US WEST will offer Netscape's Navigator client software for $25, which will include on-screen registration for Interact.

In addition, the carrier will set up and maintain home pages for users, offer a security firewall service and Internet site blocking.

US WEST already sells Internet access in Minneapolis and Omaha.

Pricing has not been set yet.

©US WEST: (800) 562-4154, Ext. 1020.

BusinessBriefs

Wireless joint venture cohorts **AirTouch Communications** and **US WEST, Inc.** last week said the first phase of the merger of their cellular offerings will begin Nov. 1, when the two companies begin providing support services to each others' domestic customers.

Aspect Telecommunications Corp. of San Jose, Calif., manufacturer of automatic call distributors, will purchase **TCS Management Group, Inc.** for $37.5 million. Nashville-based TCS offers workforce management software to automate the tasks associated with managing call center employees, such as call forecasting and staff scheduling.

Gandalf Technologies, Inc. last week announced that **Lotus Development Corp.** has purchased Gandalf's Xpress line of remote access and concentration products for Lotus employees' telecommuting requirements.

The products, to be used with services from NYNEX Corp., will provide ISDN connectivity between Lotus' Cambridge, Mass., headquarters and over 100 work-at-home employees in the field. The products and services will replace dial-up modems and analog lines used for file transfer, Gandalf said.

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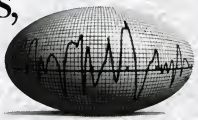

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LAN World

A Special Monthly Section for LAN Decision Makers

INSIDE LAN WORLD

Cross-connect switches bring automation to the wiring closet.
Page 2L

Windows 95 offers better networking features than its predecessors.
Page 4L

U.S. Robotics unveils ISDN products for remote access.
Page 8L

MacAskill and Le Baron say technology wars have gone too far.
Page 11L

Briefs

■ **Microsoft Corp.** *is now shipping* **File and Print Services for NetWare 3.51,** *a utility that makes a Windows NT Server look like a NetWare server to client systems. This allows end users to employ the same printer drivers they use to access NetWare servers. The software costs $99.95 per server. It also requires the use of a Windows NT Server Client Access License, which costs $39.50 per client in quantities of 20.*
Microsoft: (800) 936-3500.

■ **Stac Electronics** *last week announced a* **storage and backup application** *for NetWare that replicates selected data and makes it available as a network volume. This eliminates the need for net managers to restore data before it is available to end users.*

The company's Replica product can copy data to a second volume on a production server, or to a backup server or tape drive. Replica also stores hard-disk partition data so net managers do not have to reinstall a network operating system after a crash.

The software package includes an agent that can back up data on a Windows NT server and an administration utility that runs on Windows 3.1 and Windows 95 clients. It costs $995 per server; a license for five additional servers costs $595.
Stac: (800) 522-7822.

New tool makes NLM development a breeze

By Mark Gibbs

A new tool from High Technology Software Corp. fills the void left by one of the most surprising omissions in Novell, Inc.'s NetWare network operating system: a simple scheme for generating server-based applications, or NetWare Loadable Modules (NLM).

NLMs run under NetWare's nonpreemptive multitasking environment, and so they can be quite challenging to create for programmers used to Windows and Unix development.

Traditionally, programmers have had only two choices when it comes to NLMs: They could write in C or C++ using Novell's software developers' kit, or they could use one of the few batch processing systems, including an incredibly primitive one from Novell, that run with NetWare.

High Technology Software, known as HiTecSoft, brings to market a third alternative with its new tool, which is a comprehensive NLM development system. The tool, ManageWare, is based on a fourth-generation language object-oriented programming model with integrated visuals.

Using ManageWare, I was able to develop a sophisticated, useful NLM in a few hours. The tool seems to produce stable code, and the development environment appears robust. On the downside, ManageWare's user interface needs tuning, and some functions will frustrate developers.

Up and running

While installing ManageWare is straightforward, it reveals the product's youth.

Although the development system runs under Windows, installation relies on Windows and DOS. The visual development system is installed via a Windows Setup program. The server-based components and the compiler that comes with the developers' version are installed from a DOS batch file that invokes a NetWare-style windowed program.

The development system creates a default Windows Program Manager group for its components. It consists of the program editor, the help file, a text file of release notes, and two Windows Program Information Files that control the run-time and compiler utilities.

Death by acronyms

To simplify the creation of NLMs, HiTecSoft devised an object-oriented language it calls Network Management Language (NML).

NML is a straightforward language offering local and global variables, automatic variable instantiation, If-Then-Else and DoWhile constructs, procedures, dynamic parameter passing, and a preprocessor that supports Include and Define directives.

In NML, objects are arrays of information. For example, if I wanted to manipulate a file object, I would enter MyFile=DIR.File.First("SYS:ETC/*.*"). This creates a file object, known as MyFile, by returning a pointer to the first file found in the directory.

This object has attributes — Name, Extension, Type and Size, for example — that can be referenced by adding the attribute to the object's name. Thus, Print(MyFile.Name,".","MyFile.Extension") will display the full name of the file referenced by MyFile.

ManageWare offers objects for communications ports, data transformations, dBase data files, file I/O, NetWare console window and menu services, and network services.

When the development environment is launched, an editing window and a list of modules are

See **Development,** *page 5L*

Breaking open ManageWare

Product: ManageWare 4.0

Description: NetWare Loadable Module programming system that supports compiled and interpretive modes

Platform support: NetWare 3.X and 4.X, Windows/DOS, OS/2 character mode

Vendor: HiTecSoft of Scottsdale, Ariz.

Telephone: (602) 970-1025

Pricing: $295 for standard version; $1,495 for SDK version

Support: Unlimited for registered users

IBM readies robust network directory and security services

By Peggy Watt
Austin, Texas

IBM has added another branch to its directory services strategy with the beta release this month of Directory and Security Services (DSS) for OS/2 LAN Server 4.0.

What's in a naming scheme?

To download a report on the importance of naming in enterprise nets from Network World Fusion, link to http://www.nwfusion.com, select News+, then Local Networks.

The network operating system (NOS) add-on is designed to make net administration easier and give end users access to file and print services beyond the LAN and across the enterprise.

Like all IBM directory services, DSS is based on the Distributed Computing Environment (DCE) 1.1 spec designed by a group of vendors through the Open Software Foundation, Inc.

"This is a really good implementation of DCE from a major vendor," said Bob Sakakeeny, an analyst with Aberdeen Group, Inc. in Boston. The offering helps further validate DCE as an important technology, he added.

IBM's DSS extension will be attractive to network managers, who can use it to designate single passwords and user IDs for access to multiple domains on an enterprise network.

DSS increases the number of workgroups and users within a workgroup that can be defined under a directory naming scheme. This lets net managers organize end users by their access and operating needs, regardless of physical location.

The technology will give administrators the option of managing net resources on LAN Server nets locally, or from a centralsite or remote location.

All of the administration tools are available via the OS/2 graphical point-and-click interface and appear as additional icons and options in LAN Server. DSS uses the menu-driven installation process that drew user praise when first implemented in LAN Server 4.0 last year.

"We've heard that customers want to add on to that [LAN Server] functionality," said Art Olbert, director of LAN Systems in IBM's personal systems group. "They don't want to have to replace their workgroup functions [as they move to] an enterprise network. They don't want to do a [Novell, Inc.] NetWare 3 to 4 forced march."

The security component of DSS is also based on DCE technology, implementing authentication, encryption and authorization functions, according to Olbert. Its authentication function is based on Kerberos, as defined in DCE. Kerberos uses the approach of designating a trusted server, which can authenticate both a client and a server.

Under the encryption functions, a user's password generates an encrypted key during the logon process. The key is passed between client and server to determine user authorization and access privileges.

As an extension to a LAN directory map, DSS can provide

See **IBM,** *page 9L*

Remote management

Pointing and clicking your way out of the wiring closet

By Lenny Liebmann

Automation has finally found its way to the wiring closet, where the often-tangled mess of cable can cast a pall on a thriving network environment.

Even though physical-level moves, adds and changes seem simple enough, they can really drain resources. Since manual operations usually result in poorly documented cabling, technicians often end up spending more time tracing cable runs than they do making the changes themselves. The resulting delays in executing changes means loss of user productivity.

"If I have to go fight wires in the wiring closet, it's going to take a lot longer than if I can just select a port and set a person up at the desktop," said Peggy Bell, network administrator for Eagle Hardware and Garden Corp., a 4,000-employee retailer based in Renton, Wash.

What's more, a trip to the wiring closet can cost hundreds of dollars in some cities, such as New York, where unions hold sway over all electrical work.

It also can be very expensive to send a technician to a remote site simply to move a few connectors on a patch panel.

To help combat this resource drain, vendors have begun offering solutions for automating the wiring closet. By providing a cable-switching matrix that can be controlled from a desktop PC, companies such as NHC Communications, Inc., through its Switchex product line, and Northern Telecom, Inc., via its DynaTraX switch and software, hope to give net managers complete control over their physical networks. In the process, they may end up providing a new level of control over segmentation and resource allocation.

Transparency is key

Unlike the other devices usually associated with the term "switch," these physical cross-connects typically do not offer logical or protocol-level services. Their sole purpose is to control physical connections.

As such, these cross-connects need to offer essentially the same technical characteristics as Category 5 cabling. They must pass signals with minimal loss and be able to support the types of traffic found on Asynchronous Transfer Mode, Ethernet, FDDI, SNA and token-ring networks. They also need to provide a large enough matrix to meet the requirements of the typical wiring closet, which usually houses around 100 end-user connections.

Software functionality also factors importantly into the equation.

The most basic console interface looks similar to the patch panels in the wiring closet. Once the cables are connected to the cross-connect switch, all operations are executed from a network management console using a mouse and keyboard, rather than by navigating a maze of real wires and jacks. This not only eliminates the hassle of going into the wiring closet, but it also changes the rules of cable management.

Technicians no longer have to manually update an off-line cabling database since changes are automatically recorded by the integrated cable management software. This prevents the otherwise inevitable lapses in record-keeping from affecting the long-term integrity of the cable management system. By ensuring accurate cable management, physical-level switches enhance the ability of administrators to pinpoint network problems.

"Problems in the physical link account for a majority of network downtime," said Lynne Jackson, an analyst at Datapro Information Services Group in Delran, N.J. "Obviously, if the administrator knows which devices are connected to which cables, he or she can quickly trace the path and isolate the problem source."

Alternatively, the interface can graphically display floor plans, user names and resource icons to present a more intuitive picture of who is connected to what. Network managers make changes by dragging and dropping users into their new offices. All resources get reconnected accordingly.

Controlling a wiring closet via software can be particularly valuable for remote locations that do not have any qualified technical staff on-site. To avoid costly and time-consuming site visits, net managers can use either a modem or an inband network connection to execute physical changes in distant wiring closets right from their desktops.

Microsegments and virtual LANs

In addition to automating wiring closet tasks, these switches can open up other possibilities for network managers.

Microsegmentation provides perhaps the most dramatic opportunity. Since these switches permit totally individualized port-to-port connections, users can be placed on their own distinct segments or rings. "If I have somebody in particular who I don't want on a main ring, I will create a ring for them," said Eagle's Bell, who uses Bytex Corp.'s 7700 switch matrix.

More importantly, users can be moved freely from a port on one hub to a port on any other hub, even if the hubs do not support virtual LAN technology or switching. This is particularly important for sites with a large investment in low-end hubs.

Although many firms are implementing switching at the backbone and may migrate to VLAN functionality over time, older hubs at the floor level present an obstacle to the resegmentation of individual nodes because of the fixed correspondence between hub ports and media access control addresses. No hardware or software placed between the hub and the backbone can overcome this limitation.

But by placing a physical cross-connect switch between the hubs and user PCs, network managers can easily move nodes to and from any port they want, regardless of the hub involved. Individual users can be moved off congested segments from the management console (see graphic).

These physical-level switches range in price from $120 to $150 per port, and low-end hubs cost $30 to $50 per port, bringing the price per node to about $150 to $200. With the price for dynamic LAN switching running at several hundred dollars per port, the combination of older hubs and physical-level cross-connect switches offers obvious financial advantages.

Of course, this combination of physical cross-connect switches and hubs cannot offer all the benefits of today's LAN switches. The former do not provide dedicated bandwidth or create virtual IP subnets on a logical level. So rather than being substitutes for VLANs, these devices can either provide a short-term solution to defer more extensive and expensive network restructuring or be deployed in conjunction with VLANs to provide complementary reconfiguration capabilities between existing hubs and end users.

"These switches act as a sort of shim to gain some of the benefits of VLANs while we're still waiting for the technology to develop," said Paul Zagaeski, a research analyst at Computer Intelligence InfoCorp, Inc. of La Jolla, Calif.

Virtual cable

In addition to creating flexible segmentation options, the automated wiring closet enables network managers to perform other tricks with physical connections. For example, moves can be programmed for execution at night, when users will not be disrupted. Or, network managers can physically disconnect users from sensitive resources after hours.

"I can take all the servers at night and put them on an isolated ring so that no one can get at them," Bell said. With the physical connection removed, even the most adept hacker cannot penetrate the system.

The ability to schedule physical moves also allows scarce resources to be assigned to different user groups by time of day. For example, a number of links to a mainframe's front-end processor can be given to one shift in the morning and another in the afternoon, reducing the cost of host access.

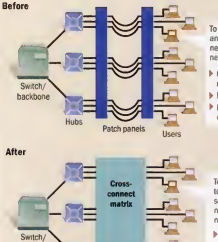
The ability to isolate all cable segments at a single point enhances testing procedures, as well. Rather than having to move around the building to get to each segment, a technician can simply plug a monitoring device into the switch and use the software to tap into each individual cable.

As networks become more complex — and as network managers run into the brick walls put up by legacy hubs and manual patch panels — users may find improved physical-level management worth investigating.

Liebmann is a Highlands, N.J.-based consultant and freelance writer who specializes in networking. He can be reached at llieb@mcimail.com.

AUTOMATING THE WIRING CLOSET

A cross-connect switch can be employed to streamline the process of moving users from one LAN segment to another.



GRAPHIC BY TERRI MITCHELL

COMMENTS?

See "How to reach us" on page 5.

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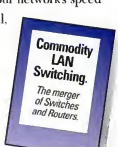

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Networking gets easier in Win95

By Ram Tackett

From the start, Windows networking has seemed more of an oxymoron than an accomplishable feat. After all, sorting out the desktop environment can be hard enough without having to deal with connectivity requirements.

First, you have to consider DOS, an antiquated operating system cobbled together with more than a decade's worth of patches and enhancements.

Then you have to take into account the networking software used to trick DOS into thinking remote resources are local.

Lastly, you have to allow for Windows, a spoiled graphical user interface that demands complete control of its surroundings.

Well, the situation is not quite so dire anymore. Microsoft Corp. has made great strides in supporting network connectivity for Windows. Here is a review of the ways Windows users currently connect to one another and a peek at how Windows 95 takes that connectivity to the next level.

Windows 3.X

Both DOS and Windows components are needed to connect Windows 3.X — an operating system with minimal capacity for networking — to a Novell, Inc. NetWare LAN. Most of the configuration is DOS-based and is stored in the NetWare shell configuration file (NET.CFG), requiring that LAN administrators be knowledgeable about protocols, interrupts, timing and other parameters.

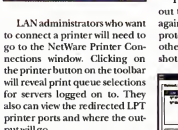
LAN administrators need to know, for example, whether Ethernet II, 802.3 or 802.2 frames are being run across the LAN. Once they have connected the clients, they can use the NetWare user tools for Windows to connect to Novell resources.

Connecting Windows 3.X to more than one type of network can be a chore. LAN administrators can link the system to NetWare, Windows NT and Digital Equipment Corp.'s Pathworks environments, for example, but it takes some sleight of hand to manipulate the software.

On the client side, a program that converts between the protocols is needed. The program, called a shim, takes a request and shoves it out as either an Open Data-Link Interface (ODI) or as a NetWare Driver Interface Specification.

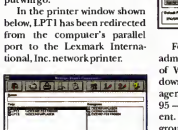
The NetWare shell tools provide one-stop shopping for resources — Novell resources, that is. Since there is no universal control, LAN administrators cannot connect an LPT port to a Windows NT print queue. For such connectivity, they would have to go to the Windows NT configuration client and create the link from there.

From the NetWare Drive Connections screen shot below, LAN ad-ministrators can get a list of active Novell servers and server volumes that are connected to local drive letters. For example, Drive F is connected to the SYS volume in the Cicero server.



LAN administrators who want to connect a printer will need to go to the NetWare Printer Connections window. Clicking on the printer button on the toolbar will reveal print queue selections for servers logged on to. They also can view the redirected LPT printer ports and where the output will go.

In the printer window shown below, LPT1 has been redirected from the computer's parallel port to the Lexmark International, Inc. network printer.

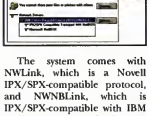


Windows for Workgroups

With Windows for Workgroups, Microsoft offers easier network configuration than available through Windows 3.X, but it is still limited.

Pieces of configuration information are scattered in various files, including CONFIG.SYS, AUTOEXEC.BAT, SYSTEM.INI and NETWORK.INI. Customization generally begins by launching Network Setup in the Network group of Program Manager.

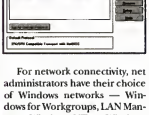
Network Setup in Windows for Workgroups lets the LAN administrator choose which networks to connect to, whether or not to enable peer networking and what protocols to bind to the net card (see screen shot below).



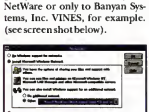
The system comes with NWLink, which is a Novell IPX/SPX-compatible protocol, and NWNBLink, which is IPX/SPX-compatible with IBM NETBIOS. Microsoft also lets users download its Data Link Connection and TCP/IP stacks.

Availability of an IPX/SPX-compatible protocol would seem to indicate that there's a NetWare client, but that is not so. If net administrators want to connect a user's computer to NetWare file and print services, they have to fall back on the DOS ODI suite.

That means they have to dig out those adapter user manuals again, since they have to know protocols, timing, interrupt and other parameters (see screen shot below).



For network connectivity, net administrators have their choice of Windows networks — Windows for Workgroups, LAN Manager, Windows NT or Windows 95 — and one non-Windows client. They can specify for Workgroups to connect only to NetWare or only to Banyan Systems, Inc. VINES, for example. (see screen shot below).



Windows 95

Enter Windows 95, through which network configuration is managed from the Control Panel's Network application. Finally, Microsoft has introduced some semblance of the universal network client and central configuration control.

Windows 95 does an excellent job of hunting down network cards installed in a computer and makes it easy to add network components. A click of the Add button shows clients, adapters, protocols and services that can be installed.

It comes with a client for VINES, two Network File System clients for Unix-based networks, a NetWare 3.X-compatible client and a Windows networking client that can provide connectivity to Windows for Workgroups, other Windows 95 machines, LAN Manager or Windows NT (see screen shots below).

In Windows 95, Microsoft also has relieved some of the burden networking places on DOS memory by implementing the networking layer as virtual device drivers (VxD).

These VxDs, which load after Windows starts, are usually implemented as 32-bit programs so are not limited to 640K bytes or the upper memory boundary of regular 16-bit DOS programs.

This means a network administrator can load a couple of network clients and run a TCP/IP stack, and still have more than 525K bytes free for any old memory-hungry DOS program.

What's more, Windows 95's peer networking is vastly improved over the capabilities found in Windows for Workgroups. Now, LAN administrators concerned about users giving out passwords for peer resources can enable user-level access control.

With user-level access control, Windows 95 clients will utilize pass-through logon validation by a Windows NT or NetWare server.

Before allowing access to a shared resource, Windows 95 verifies the user ID and password of the person attempting the connection against the specified Windows NT or NetWare security mechanism. If the password cannot be verified, the user does not get in (see screen shot above).

Besides easier configuration, Windows 95 brings many other benefits to the networking arena.

One-stop net shopping is now available from Windows 95's Network Neighborhood icon, for example. From this launching point on a Windows desktop, users can browse available network resources, connect to them and explore them.

For example, a user who needs to connect to a networked printer can explore that server and double-click on the icon for the printer. If the user does not have print drivers installed for that printer, it is not a problem. Windows 95 will help install them if the user knows the make and model of the printer. Soon, even this knowledge will not be a requirement.

The Windows 95 Explorer shell, which replaces the File and Program Manager windows of previous versions, makes it easy to permanently map a network drive to a local drive letter. That functionality is incorporated in the File menu.

Windows 95 has the potential for being a great network client, but there is a catch: hardware. According to Microsoft, the typical installation of Windows 95 requires 40M bytes. The company recommends at minimum a 386-based computer with 4M bytes of memory but suggests that 8M bytes is better.

At a minimum, 14M bytes of memory are needed either as RAM alone or in conjunction with a hard-disk swap file.

If your company is planning deployment of OLE-enabled productivity suites, this won't cut it. Plan on a minimum of 12M to 16M bytes of RAM on those machines.

Tackett is an industry analyst with Currid & Co., a research and consulting firm based in Houston. He can be reached at (713) 789-5995 or on the Internet at tackett @currid.com.

Development

Continued from page 1L

displayed.

A project is constructed from a number of procedures that will always at least include Main and Header.

The modules include header files that define constants and user code templates that provide skeleton structures for standard functions.

Modules can be dragged and dropped into procedures in the project as needed. The editor also has a browser for commands, functions and constants, which helps streamline the creation of NML code.

Once a ManageWare NML program is created, it can either be run under HiTecSoft's Open Interactive Shell, available for both DOS and NetWare, or compiled into an executable NLM or EXE file.

For the NetWare environment, HiTecSoft has gone to considerable lengths to allow for NetWare 3.X, 4.X or generic NLMs. Programmers can weigh the tradeoffs between generality and performance optimization.

When the Run option is selected in the development environment, the ManageWare preprocessor checks the code and passes the result to the DOS run-time. Under Windows, this opens a DOS session to execute the program.

Alternatively, the NetWare equivalent of the Interactive Open Shell can be invoked on the server. Then, the same code that runs under DOS can be executed under NetWare.

While all DOS-based NML programs can be run under the server shell, the reverse is not completely guaranteed. HiTecSoft's strategy is to implement enhancements to its server run-time before it extends the DOS version. For this reason, most functions that return server statistics can only be accessed by server-based NML programs.

The core of the server run-time is a Network Management Extension module. This component allows access to all server functions and can be used by C programmers as a layer to insulate their software from the complexities of the NetWare environment.

Managing ManageWare

As a test, I decided to use ManageWare to create an NLM that would regularly extract server statistics and write them to file in HyperText Mark-up Language. This would allow a World-Wide Web browser to retrieve server status information.

I took some of the example code that comes with ManageWare as a base.

The editor is a little clumsy to use. For example, there is no way to select what font and point size the Edit window will use, and the toolbar is not configurable.

HiTecSoft's documentation is thorough but has lots of rough edges and misspellings. On the other hand, the on-line help is a useful reference.

I really got frustrated when I made programming errors. The resulting diagnostic messages are poorly presented. For example, I kept getting a message that I had an illegal backslash in my code. It turned out there was an illegal character — not a backslash — in the source file.

Another problem is that if the preprocessor finds an error, it reports the line on which the problem occurs. Unfortunately, the debug option to go to the last error does not work.

Even so, I tracked down the errors and wound up with working code.

It took me only two hours to familiarize myself with and create the NLM for my NetWare 4.1 server.

HiTecSoft plans to ship ManageWare 4.0, which includes support for NetWare Directory Services, today.

Support for IP, general network services, remote procedure call and NetWare symmetric multiprocessing is expected in early 1996.

ManageWare is an excellent value, and I highly recommend it for network administrators who need to automate a process or IS managers who need to develop tools. In the 10 hours I played with and abused ManageWare, it produced code that, when I got the syntax right, ran without problems.

Gibbs is a writer and consultant in Ventura, Calif. He can be reached at (800) 622-1108, Ext. 504 or on the Internet at mgibbs@gibbs.com.

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Circle Reader Service #2

AMP

U.S. Robotics targets remote access with its new offerings

By Joanne Cummings
Skokie, Ill.

U.S. Robotics, Inc.'s Corporate Systems Division has unveiled several products designed to help companies incorporate ISDN in their remote LAN access environments.

The company, based here, introduced remote access servers and modem pools that enable users to support remote analog and ISDN connections through the same box. It also took the wraps off a Primary Rate Interface card for its high-end remote access hub.

With the access servers and modem pools, network managers will be able to provide telecommuters and traveling users with the type of remote LAN connectivity they need.

Analysts said the offerings will let user organizations standardize on one box while supporting different access methods.

"ISDN is being rapidly deployed, but you can't get the same types of services nationally," said Maribel Lopez Howard, a research analyst for Framingham, Mass.-based International Data Corp. "Rather than having two platforms to support areas that have ISDN access and those that don't, this is a viable solution."

Speed gauging

The products feature U.S. Robotics' Universal Connect software for automatically detecting the type of connection and negotiating the top speed for the call. The software supports analog connections at up to 33.6K bit/sec or switched 56K bit/sec, and ISDN connections at 56K or 64K bit/sec.

The remote access server comes in eight- and 16-port models, called the Total Control NetServer/8 I-Modem and Total Control NetServer/16 I-Modem, respectively. Both support dial-up IP and Novell, Inc. IPX sessions; support for Apple Computer, Inc.'s AppleTalk protocol is scheduled for shortly after the initial release. The servers also include support for PPP, SLIP, Compressed-SLIP and telnet.

According to the company, the products also can be used to provide backup dial-up LAN-to-LAN routing because they offer inverse multiplexing and programmable load balancing. These capabilities allow dial-up routing channels to be aggregated as data flow increases.

The servers can be managed via a telnet command-line interface or a U.S. Robotics Windows-based management platform. They also include a variety of security capabilities, including mechanisms that control packet and protocol filtering. This lets administrators control which applications are available to dial-up users, the company said.

The remote access servers will be available in the first quarter of 1996. The NetServer/8 I-Modem and the NetServer/16 I-Modem will cost $10,995 and $16,995, respectively.

Like the servers, the modem pools come in eight- and 16-port models.

The Total Control MP/8 I-Modem and Total Control MP/16 I-Modem can be used to connect dial-up users with other devices, such as a rack of PCs, a terminal server, a router, an asynchronous host or a front-end processor.

Both models are configured with flash read-only memory, which enables software upgrades to be automatically downloaded. They also can be remotely configured, U.S. Robotics said.

The modem pools have two forms of security: Dial-back security lets administrators specify whether users can gain immediate access or whether the system should call them back at a predesignated number. This capability is primarily for users dialing in to the corporate network from a fixed location.

For users needing to dial in from varied locations, the products support U.S. Robotics' Link Security software, which lets administrators program a code into authorized user modems. Only modems with the special code are allowed access to the network, the company said.

The modem pools will be available in December. The eight-port model will cost $6,995 and the 16-port model $11,995.

New PRI card

In addition to the stand-alone servers and modem pools, U.S. Robotics unveiled a PRI card for its Total Control Enterprise Network Hub.

The cards add to the current capabilities of the hub, which provides for analog dial-up, ISDN, frame relay and X.25 access to a variety of corporate LAN environments. The hub can house as many as five PRI cards, each of which supports two PRI links, U.S. Robotics said.

The PRI cards are for use in conjunction with the firm's NetServer remote access server cards.

One PRI card set supporting two PRI spans will be available in December for $5,995. The NetServer remote access server card set costs $11,995, and the hub ranges in price from $20,000 to $80,000.

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Circle Reader Service #1

Persoft offers heterogeneous support via PC-to-host connectivity software

By Joanne Cummings
Madison, Wis.

Persoft, Inc. has rolled together a variety of its existing PC-to-host connectivity software in an effort to better support heterogeneous computing environments.

The software package, which also provides Internet access, is designed to offer corporations a one-stop solution for all their PC-to-host connectivity needs. It saves administrators time and headaches by incorporating several types of access into one package, with one install, said Persoft, based here.

The software, called SmarTerm Enterprise Suite Version 5.0, includes connectivity for IBM, Digital Equipment Corp. and Unix hosts, supports X Window System servers and features the latest version of the Navigator browser from Netscape Communications Corp.

It also provides simultaneous support for English, French, German and Spanish languages.

The SmarTerm Enterprise Suite software runs on any IBM 386-based PC running Microsoft Corp.'s Windows 3.1 operating system or above. According to Persoft, it offers full-featured emulation of Digital VT-340 graphics terminals and VT-420 text terminals, as well as IBM 3278 terminal Levels 2 through 5 and 3279 terminal Levels 2 and 3. It also includes The Santa Cruz Operation, Inc. Console and ANSI-BBS support.

With the Navigator, users can get seamless access to Internet resources and gather information from Netscape's newsgroup services on the World-Wide Web, Persoft said.

In addition to varied host connectivity, SmarTerm software also includes TCP/IP and Digital's Local Area Transport protocol stacks, a full 32-bit, X11R5-compliant X Window server and Internet dial-up support via SLIP or PPP.

SmarTerm Enterprise Suite Version 5.0 is available now for $295. It comes in CD-ROM and 3.5-inch disk forms.

©Persoft: (800) 368-5283.

IBM

Continued from page 1L

a single logical net. Its initial release will support clients that run OS/2, DOS, Windows 95, Windows NT and Windows 3.X.

A DSS network directory can also provide views of other systems that support DCE 1.1, such as servers from Hewlett-Packard Co. and Digital Equipment Corp.

IBM expects to release DSS in early 1996, about the same time it ships OS/2 Warp Server, which is also in beta test, Olbert said. DSS also supports OS/2 Warp Server, which is an application server NOS based on OS/2 Warp 3.0, which shipped a year ago.

IBM positions OS/2 Warp Server as combining the technologies of OS/2 Warp 3.0 and IBM LAN Server 4.0, which is based on OS/2 2.11.

IBM expects Warp Server to eventually replace LAN Server.

Olbert characterizes most LAN operating systems — including LAN Server and NetWare — as focused on file and print services, while Microsoft Corp.'s Windows NT Server fills the role of application server. But there is not one that by itself provides the structure for enterprise computing services, which IBM intends to supply through DCE technology, according to Olbert.

Olbert calls DCE "the basic middleware infrastructure" for both OS/2 and AIX. In fact, development of such basic integrated services for both NOSes is done by the same IBM team, he said.

Hand in hand with IBM's commitment to DCE is its reliance on its Distributed System Object Model (DSOM), which specifies the interface that enables object classes in different environments to interoperate, even across heterogeneous enterprise networks. DSOM is being beta-tested.

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Circle Reader Service #3

NET RESULTS

Praying for technology wars to end

Over the last 24 months, far too many technology battles have been foisted on the general public by the marketing departments of network product vendors.

If it wasn't 100VG-AnyLAN vs. fast Ethernet, it was ATM takes on everything or switching vs. routing.

To sort all of this out, you would need a truly in-depth knowledge of networking hardware and software.

A little healthy competition never hurt anyone, but this new round of technical warfare has the zealous overtones that marked the initial Ethernet vs. token-ring skirmishes. Worse yet, there are now many simultaneous battles being fought in the press, in nondisclosure presentations and even at seminar series.

How much is too much? And is all this going back and forth supposed to really benefit anyone?

Skip MacAskill and Melinda La Baron

To answer the first question, we believe that the point of no return was passed quarters ago by many of the more maniacal vendors hoping to cash in on controversy. As for the second question, vendors say yes. But we have had too many calls from users frustrated with technology warfare and bloodied by hostile vendor visits.

What do we believe? This type of technical mudslinging clouds relevant network issues, extends the buying cycle, and adds confusion and controversy to an already complicated subject.

So if this is all true, what keeps driving vendors to get caught up in these battles? The simple answer is the vendors.

Let us suppose for a minute that we were vendors and had only one type of technology in development. This could be due to a lack of engineers, engineering talent or foresight on the part of our product managers. When customers come to us, or we unleash the sales force with our latest virtual strategy, all we have is the new technology to market.

This technology becomes the epitome of technical excellence in our eyes. It far surpasses anything normal mortals could either create or comprehend. We, of course, are right and everyone else is wrong about this technology — it is the only thing we have now.

Once we have communicated our vision of networking excellence, we have every right to develop the competing technology and revamp the virtual strategy — typically six months after the original product shipped.

When we have options, we can be magnanimous. When we do not, we are driven.

Does this give you some idea why the warfare continues?

Should users be subjected to the whims of vendor product development and hungry marketeers?

Of course not. If a vendor has to put out a press release to detail the success of its pet technology, this should immediately raise a red flag that indicates something is seriously wrong.

And do not be swayed by vendors bearing statistics — numbers can be sliced and diced in infinite ways to prove a vendor's point. The number of 25M bit/sec ATM ports shipped in PCI machines that had blue front panels in the state of Mississippi has little bearing on how the technology will perform in a real network.

We'd like to leave you with one final thought: Even the most rabid members of the technology wars can change their loyalties. Just watch.

MacAskill is a senior research analyst and Le Baron is a research director in Gartner Group, Inc.'s Network Computing Infrastructure group. They can be reached by E-mail at inquiry@gartner.com or by phone at (203) 316-1111.

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Circle Reader Service #48

Covering: Databases • Messaging • Groupware
Conferencing • Imaging • Multimedia • Development

Briefs

■ *Last week,* **Sybase, Inc.** *rolled out the* **Sybase Replication Driver for ODBC,** *an add-on product for Sybase's Replication Server. The new driver lets Replication Server copy information from several brands of source databases — such as Sybase SQL Server and DB2 — to Open Database Connectivity-compliant target databases, including Lotus Development Corp. Notes and Microsoft Corp. SQL Server. Pricing ranges from $900 for a single user to $10,500 for unlimited users.*
Sybase: (510) 922-3500.

■ **Progress Software Corp.'s Crescent Division** *has released EnQuiry, a client/server development tool that lets* **Visual Basic** *developers build forms and database queries without writing code. Until Oct. 31, the price is $299; after that, it will be $395.*
Crescent: (800) 352-2742.

■ *Marlborough, Mass.-based* **Gradient Technologies, Inc.** *this month announced that it will port the Open Software Foundation, Inc.'s* **Distributed Computing Environment (DCE) 1.1** *to AT&T Global Information Solutions' (GIS) MP-RAS operating system. MP-RAS is an advanced version of Unix System V Release 4 that runs on AT&T's high-end server. GIS will also resell Gradient's line of desktop products, which implement DCE on Windows and UnixWare.*
Gradient: (508) 624-9600.

■ **Visix Software, Inc.** *and* **Expersoft Corp.** *this month agreed to integrate their respective products, the Galaxy Application Environment and the PowerBroker object request broker ORB) by year-end. As a result, PowerBroker will be able to interconnect and manage two kinds of objects: those generated by Galaxy and objects that conform to the Common ORB. Both products support an array of operating systems.*
Visix: (703) 758-2763; Expersoft: (619) 546-4100.

Percussion bangs out improved Notes links

By John Cox
Stoneham, Mass.

Lotus Development Corp. Notes users will be able to access and update data stored in relational databases through a feature that is part of Percussion Software, Inc.'s Notrix Composer 3.0.

Each time users open a Notes document or database that employs the new feature, called Notrix Composer Live, the Notes server will connect to a designated relational database and pass on updated information to the document. Data changes at the desktop can be passed back to the relational database.

The software should make it much easier to blend the record-oriented data in relational databases with the documents and other unstructured information stored in Notes databases, according to analysts. But customers have to be careful to protect the integrity of the relational databases, they added.

"It lets Notes programs access data without having to know whether the data is in Notes or in relational databases," said Tom Austin, a research director with Gartner Group, Inc., a Stamford, Conn., market research company. "We consider this a potentially significant product."

Blending data from Notes and relational databases is a key requirement for many Notes customers, said Matt Cain, vice president of workgroup computing at META Group, Inc., another market researcher in Stamford. Previously, users had to build separate applications outside of Notes, employing tools such as Gupta Corp.'s SQLWindows to pull data from Notes and SQL databases. "With [Notrix Composer Live], you can intermingle the two data types from within the Notes clients," Cain said.

Most Notes-to-relational database integration tools, such as the previous Notrix Composer release, make copies of relational data and move them into Notes for storage, said Audrey Augun, vice president of marketing at Percussion here. A lot of programming is needed to move data back and forth and to make sure that the information in both databases is synchronized.

To use the new feature, Notes administrators fill in a set of forms to identify the relational data and the Notes documents that are to be linked. The network connection is made either through an Open Database Connectivity (ODBC) driver or a direct connection to a database.

When an end user opens a Notes document, the Percussion software reaches out to the appropriate database and enters into the document the latest information from the database.

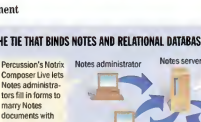
As a server program, Notrix Composer Live ensures centralized control over production data in relational databases.

Notes administrators can create a degree of data integrity by using the Locked Update Option, which blocks an update to the relational database by a Notes user if the relational data has been updated by someone else in the meantime. The Percussion software also offers features to track, record and respond to transaction failures.

Notrix Composer 3.0 will be available Oct. 30 and priced at $3,750 for the basic package. With Notrix Composer Live, the price will be $7,500, which includes an ODBC driver, a flat-file driver and other capabilities. Each database-specific driver costs an additional $3,750.

✆Percussion: (617) 438-9900.

THE TIE THAT BINDS NOTES AND RELATIONAL DATABASES



GRAPHIC BY TERRI MITCHELL

PeerLogic plugs management holes in middleware

By Barb Cole
San Francisco

PeerLogic, Inc. last week rolled out a new version of its message-oriented middleware software that includes a set of graphical user interface-based management tools for more easily setting up and managing distributed applications.

Pipes 3.6 features Namespace Viewer, a Windows-based utility that provides a graphical view of Pipes resources, and Desktop Configurator, for graphically creating and editing Pipes configuration files.

Both tools support large-scale deployment of applications using the middleware.

Pipes Platform provides a messaging backbone for distributed applications running on a range of operating systems, hardware platforms and network protocols. Its name service allows application components to advertise their availability, find one another and communicate, regardless of location.

Namespace Viewer provides a graphical look at computers and applications registered with Pipes, making it easier to troubleshoot applications.

Desktop Configurator automates the task of building a configuration file needed in order to register a resource on the Pipes system.

"Namespace Viewer is neat, but we're more excited about Desktop Configurator because it will eliminate the potential for errors when editing the [configuration] files," said Brent Holm, Unix systems administrator at Portland-based Blue Cross and Blue Shield of Oregon.

Available now, Pipes 3.6 costs $200 for a single desktop and up to $50,000 for a single MVS license.

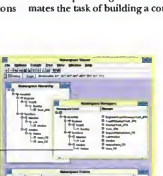
The software runs on Windows, Unix, MVS, OS/2 and NetWare.

✆PeerLogic: (415) 626-4545.

NetworkWorld Fusion
Feeling stuck in the middle about middleware? Check out this additional information about middleware on Network World Fusion:
▶ An introduction to middleware
▶ A guide to buying middleware and other client/server tools
▶ A look at what IBM and other vendors are doing for middleware.
To access: Point your browser at http://www.nwfusion.com. Select News+ and then Client/Server Applications.

PIPES 3.6 CLOSE-UP

The Pipes Namespace Viewer lets net managers track when a system or application resource starts or terminates.



SHARED LOGIC
Mike Rothman

Picking a directory plan — A matter of sync or swim

It's been said that history repeats itself. Well, the wonderful world of technology is no exception.

If you turn the calendar back about 10 years, many users at that time figured out the need to provide connections between heterogeneous mail systems. Innovative organizations such as SoftSwitch, Inc. emerged to meet the need of moving mail from one system to another.

Now there is a similar need in the market for synchronizing different vendors' messaging and network operating system (NOS) directories across an enterprise.

Many of my clients must support between 25 and 30 directory structures (comprising user IDs and passwords) when considering their application directories, voice mail, trading partner profiles and more.

Clearly, this is not the efficient type of network infrastructure we are all after.

Usually the most visible synchronization issue resides within the messaging directory space. You can typically get mail from one system to another fairly easily, but integrating mail directories presents far more problems.

Yet from the end-user perspective, this is a must.

That is because end users do not really care if I or someone else is on their home mail system; they just want to be able to address a message to me from their mail client.

This problem can be addressed today using two approaches: implementing an enterprise directory backbone or using a directory switch. These are very similar to the options for passing messages between different E-mail systems, eh?

The directory backbone is typically an adjunct to a messaging switch and utilizes a distributed directory database — typically X.500. Using this technology, a subset of the enterprise directory resides at multiple locations across a network.

A directory switch, available from vendors such as Hitachi Computer Products America, Inc., pulls all directory information from the enterprise to a central location, synchronizes it, then propagates the changes back.

Which one should you choose?

Both will get the job done. The real decision remains whether you want to start playing with X.500. That specification is pretty much the only alternative today if you want to roll out a directory backbone, but it is neither cheap nor easy to deal with.

Yet this is only the tip of the synchronization iceberg, so to speak.

What users really need is a way to integrate all their directory services, not just messaging.

This is the real functionality gap in the market today. Many of the directory switch, backbone and NOS vendors have expressed intentions to expand their products to interoperate with other directories, but legitimate products will not be forthcoming for years.

For the short term, network managers should start factoring directory interoperability into their client/server infrastructure selection criteria.

A few database and messaging server vendors have already pledged interoperability with Novell, Inc.'s NetWare Directory Services, so there is hope.

Rothman is a vice president in META Group, Inc.'s Global Networking Strategies service in Reston, Va. Feedback is welcome either by E-mail at mikerr@metagroup.com or by phone at (703) 860-6600. Rothman's column alternates in this space with that of Marc Myers, president of Client/Server Connection, Ltd.

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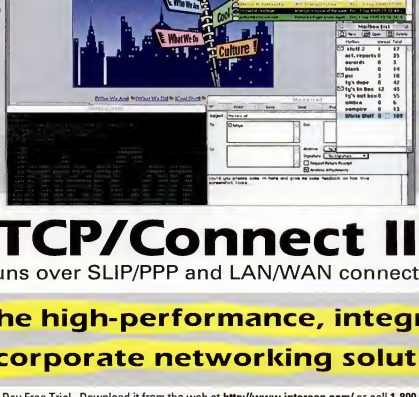

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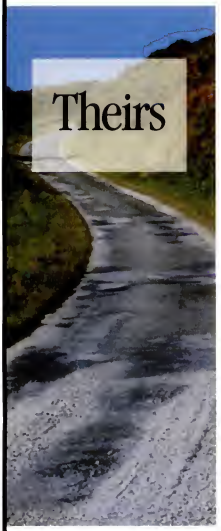
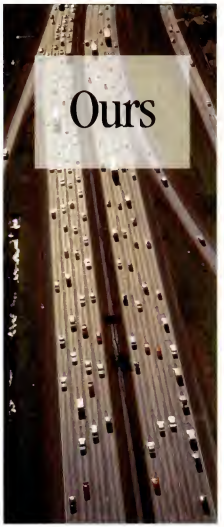
Which is the best route for your company's Internet traffic?





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Electronic Commerce

Covering: Tools and Techniques for Interenterprise Networking and Doing Business On-Line

Briefs

■ **Vermeer Technologies, Inc.** *has begun shipping FrontPage, a* **World-Wide Web site management** *and authoring tool that lets users design Web pages without needing to know the Common Gateway Interface scripting language. FrontPage uses what Vermeer calls WebBots, preprogrammed drop-in objects for functions such as forms, discussion groups, surveys and text searches. FrontPage, developed to work on commercial and shareware Web servers running Unix, Windows NT, Windows 95 and Windows 3.1, costs $695.*

Vermeer: (617) 576-1700.

■ **The Wollongong Group, Inc.** *is integrating public-key encryption and* **digital signature** *features based on RSA Data Security, Inc. technology into its Emissary software products for accessing the Internet. Wollongong will ship security-enhanced versions of Emissary by year-end and develop a new software product that encrypts at the TCP/IP stack level in 1996.*

Wollongong: (415) 962-7156.

Separately, **Working Set, Inc.** *said it will incorporate* **RSA Data Security, Inc.** *public encryption into its DataRamp product, providing read and write access to relational database systems over the Internet.*

Working Set: (617) 863-2339.

■ **Management Sciences Associates, Inc.,** *a Pittsburgh-based research and software services firm, has developed a* **decision-support** *tool, called BusinessWeb, designed to help marketing and sales managers access and analyze data from multiple internal and external data sources using the HyperText Mark-up Language-based BusinessWeb browser.*

Management Science Associates: (412) 362-2000.

Firms face business pitfalls on the 'Net

By Ellen Messmer

The Internet offers businesses a new frontier for marketing and sales, but banks and retailers active on the World-Wide Web are finding that it takes true grit to overcome obstacles such as inadequate security.

When Netscape Communications Corp.'s security protocol, the Secure Sockets Layer (SSL), was cracked last month by two graduate students, Wells Fargo Bank quickly shut down the online banking service it offers customers via its Netscape Web server.

Netscape released a software patch to remedy the SSL security flaw, and Wells Fargo last week brought its Internet banking service back on-line for reviewing account information and transaction history.

"We're requiring customers to download the Netscape browser Version 1.12 or 1.22 with the fixed SSL," said Wells Fargo spokeswoman Lorna Doubet.

First Union Bank was also impacted by the SSL security failure. First Union uses a secured Web server from Open Market, Inc., which accepts credit card applications in encrypted form from browsers that support either the SSL or the Secure HyperText Transfer Protocol (S-HTTP).

Like Wells Fargo, First Union initially shut down its Web site due to the SSL flaw. It later decided to bring it back up with a disclaimer and notification, which instructed customers where to find the SSL patch.

"First Union decided this was the responsible approach to take in this case," said Frank Taylor, president of Raleigh, N.C.-based consultancy Trinova Services, Inc., which manages First Union's Web site.

Banks are not the only ones worried. Retailers say the Internet is attracting a bold breed of cybercriminals who presume on-line merchants are easy to fool.

"We've caught a lot of stolen credit cards that people have given us," said Bill Rollinson, vice president of marketing at the Internet Shopping Network (ISN).

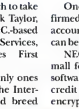
ISN, a subsidiary of the Home Shopping Network on America Online, Inc. and CompuServe, Inc., is a Web retailer that sells a wide range of manufactured goods and leases space at its cybermall to catalog companies.

To thwart cybercrime, the ISN runs extensive checks on credit card numbers, not only verifying the card number through the usual bank channels, but also checking the buyer's phone number and E-mail address.

Once a card number is confirmed, the ISN sets up an account so multiple purchases can be made.

NECX Direct, an Internet mall for buying computers and software, also prefers not to take credit card numbers, even in encrypted form, on-line.

NECX Direct



Randall *said his Internet company prefers not to take credit card numbers on-line.*

"For our corporate customers, we have an on-line credit application they can complete," said Scott Randall, NECX Direct's general manager.

"Once you get credit approval, you have a dollar limit on what you can buy with a password," he said. "We only ship to the address we have specified for that sale."

NECX Direct also does extensive checking before mailing computer goods to consumers purchasing with encrypted credit card numbers. "We have to because we get mailed for the cost of the fraud," Randall said. NECX Direct now does over $500,000 in business each month, spending up to $20,000 monthly for link listings at other Web sites. ■

ON-LINE

See the different approaches vendors are taking to on-line shopping on Network World Fusion. Link to http://www.nwfusion.com, select News+, then Electronic Commerce.

BUSINESS SPACE

Similarities? I heard it on the grapevine

A friend of mine, Paulina Borsook, just sent me a note about a "way kool" service on the Internet.

The service's owner, David Whiteis, sent her a note urging her to try it out, with hopes that he might get mentioned in *Wired* — for which Borsook has been known to pen a piece or two.

So, David, perhaps to your surprise, here you are in *Network World*. Perhaps it's not quite the cachet of *Wired*. (We don't print in vermilion italics with gold-leaf drop caps on a scarlet page.) But at least in this publication, you can figure out where the articles begin and end. But I digress.

Mark Gibbs

Before I get around to David's service, I should point out that this sequence — David telling Paulina, Paulina telling me, me telling you, you telling someone else — is a much underrated attribute of the 'Net.

This is because that apart from being the eighth wonder of the Internet, the Internet is the biggest grapevine ever. This column, for instance, is a great example of how the 'Net works in spreading a message.

It just goes to show that advertisers and PR folks have a lot to learn about the dynamics of on-line promotion — the least of which is that if you can identify and inform enough people who are really interested in what you have to say, those people will handle mass advertising for you.

Now, back to David. What he's offering is a service on the Web called The Similarities Engine. This will take a list of your five favorite musicians and their albums, and send you, via E-mail, a list of recordings that might be of interest to you. So far, David tells me that 10,000 people have tried it.

I sent my mainly jazz list: two Art Porter (my hero) CDs, Boney James, Brecker Brothers and B-Tribe. I got back a list that looks pretty interesting. (David tells me the system struggled with my tastes; most of the lists submitted are in the Nirvana, Hootie and the Blowfish, and Pink Floyd vein.)

My list of suggestions contains a lot of artists I know of and a few I don't recognize. This is good because the ones I know begin to validate that David's system apparently understands my tastes.

The downside is that the ones I don't know look interesting. Now I have to go and buy all these albums to see how good that understanding really is. Perhaps I can expense it as research?

So how does David's system work? Well, he's not saying.

But here at the Gibbs Institute of Reverse Engineering and Wild Hypotheses, we've come up with two ideas.

At the high end of guessing is that he's digitized countless CDs, fed the data through a massive neural network that analyzed them for rhythm, structure and dynamics, and built a gigantic cross-reference table to produce the results. At the low end, he gets your query and calls up a dozen audiophile friends and, voila, instant list. We favor the latter.

You might want to try it out at http://www.webcom.com/sc/.

Gibbs craves your indulgence. Tell him what's up at mgibbs@gibbs.com, or call him at (800) 622-1108, Ext. 504.

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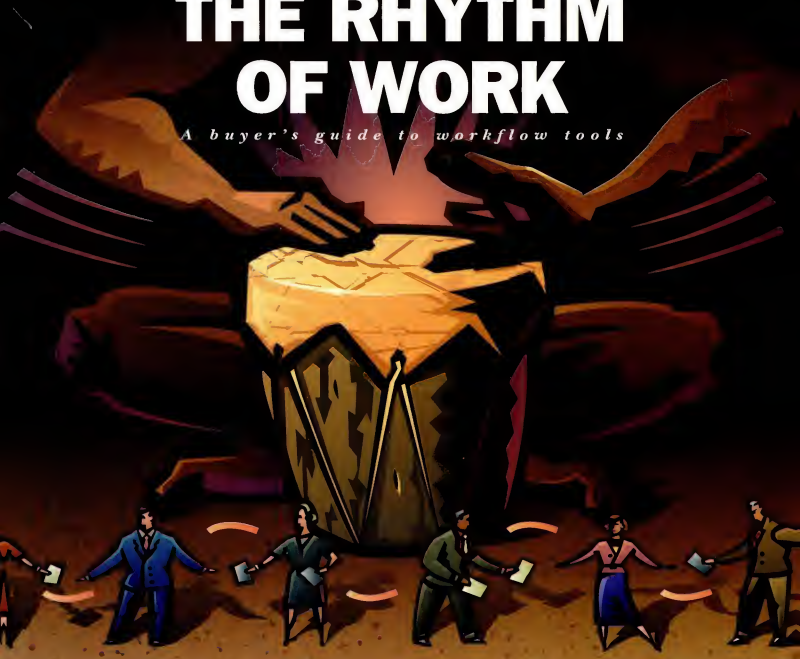
THE RHYTHM OF WORK

A buyer's guide to workflow tools



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Circle Reader Service #33

Laying down the workflow path

In this issue's cover story on workflow management tools, consultant Ronni Marshak with the Patricia Seybold Group is quoted as saying that E-mail-based ad hoc tools are well suited to supporting serendipitous workflow processes. In other words, they are good at handling unstructured processes that emerge from everyday interaction.

That may be the case, but the talk of serendipity and workflow has to end there, for there is nothing serendipitous about finding a good workflow tool. All one has to do is take a quick look at the accompanying product list to realize that not even the luckiest of lucky people is likely to accidentally stumble upon the best workflow tool for his or her company's needs.

Sure, similarities between workflow tools abound — every workflow tool runs on Windows desktops and almost all support TCP/IP networks and NetWare, for example. But the differences are far more plentiful.

One workflow package might offer great process-design tools, while routable-object design tools are another's forte. Some are cheap enough to write off on a monthly expense report, while others require major capital outlays. Some can be popped right into an existing environment, while others demand changes of network connections, E-mail systems, directory services or database servers.

It will take careful planning to make the most of workflow. For none of these tools, no matter their strengths, can make your company function better in and of themselves. If you've chosen an inappropriate tool for what you're trying to accomplish or for your operating environment, little good will come of it.

So take a look at the workflow tool buyer's guide that begins on page 12. It should get your thought processes flowing in the right direction.

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Cover illustration by Mike Kesse

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DEPARTMENTS

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SUM OF THE PARTS

Tips and tidbits about collaboration products, issues and trends

Getting a fix on workflow

Workflow architects creating a new system or changing an old one can get an idea how a design will work with the Prophesy visual simulation system from Abstraction Software Co.

In its second release, the Windows-based Prophesy software lets users determine the time it will take for a job to be completed or whether there is a better way for documents to flow through the system, says Israel del Rio, general manager of Abstraction Software in Highlands Ranch, Colo.

"Prophesy lets users create what-if scenarios," del Rio says. "They can simulate a change, get information on how long it takes to complete a job and determine whether more resources are needed."

Prophesy Version 2, which also can be used for network modeling, provides transaction flow animation for visualization of a workflow system and a variety of wizards for the quick creation of model topologies. It also features a histogram function, model cost summary and the ability to extend the model via interfacing to external applications.

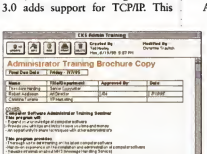
"This is a useful low-cost tool that met our needs, which weren't real intensive," says Glenn Blakley, both names telecommunications consultant at Occidental Petroleum Services in Tulsa, Okla.

Prophesy Version 2 requires Windows 3.1 or above, and a 386-, 486DX- or Pentium-based computer with at least 4M bytes of memory. It costs $599.

TCP/IP fosters common knowledge

On Technology Corp. has released a new version of its Common Knowledge client/server application that lets team members working on DOS, Macintosh and Windows computers collaborate on documents.

Besides bringing DOS support to the workgroup collaboration environment, Common Knowledge Version 3.0 adds support for TCP/IP. This means that team members can now use the software, which previously worked with Apple Computer, Inc.'s AppleTalk, IBM's NETBIOS and Novell, Inc.'s IPX protocols, to interact over the Internet.



At Catapult Entertainment, about 65 users tap into Common Knowledge for a variety of reasons. They use the tool to create sign-up sheets, post the latest versions of frequently revised documents, disseminate corporate information and, in the most truly collaborative application, jointly author documents.

The company runs AppleTalk, IPX and TCP/IP on Ethernet LANs, and uses AppleTalk and TCP for the Common Knowledge server. "One of the things I like about the product is that it is very network-protocol sensitive. And it's truly cross-platform, so all clients can talk to one server," Stadler says.

Through Common Knowledge Version 3.0, On Technology also gives users the option of installing the software as a NetWare Loadable Module so that they do not have to dedicate a machine as the server platform. It also provides several new features, including the ability to create predefined folders and give read-only access.

"To its credit, On [Technology] has made the client software easy to use," Stadler says. "It takes me one minute to explain the concept, and within 10 minutes, everybody's using it."

Common Knowledge Version 3.0 comes in 10- and 50-user increments. Pricing ranges from $57 to $79 per user, depending on quantity. On Technology, of Cambridge, Mass., also offers upgrades to existing users for a nominal fee.

Handy Handbook

The new book *Groupware: Technology and Applications*, a compendium of articles by some of the biggest names in the business, is a useful resource for anyone investigating use of technology to support team effort.

The book is broken down into three main sections. The first, "Technology and standards," covers everything from E-mail to workflow to electronic meeting systems. There isn't a lot new here, but there are a few good insights to implementation issues and lessons from the field.

Section Two, "Vendor strategies," is even thinner, given that it is vendor-written. But there is some value in hearing it straight from the horse's mouth. The biggies are included: Lotus, Microsoft, IBM, Novell and Digital.

Where the book gets interesting is in Section Three, "Implementation and management strategies and case studies." Subchapters here include "Designing team support application to meet business objectives" and "Building computing solutions with the team metaphor." There are cases on the Bank of Montreal, the World Bank and Coopers & Lybrand.

The Prentice Hall book was pulled together by David Coleman, editor of the *Group Talk* newsletter and principal of Collaborative Strategies, and Raman Khanna, director of distributed computing and communications systems at Stanford University.

Phone home

NASA flight coordinators at the Johnson Space Center in Houston recently conducted the first real-time PC-based conference with an orbiting object when they used a link to the space shuttle Endeavour to share computer-based information.

Astronauts typically share data with Houston using time-consuming file transfers. Brett Parrish, project engineer at the space center, said use of Intel ProShare personal conferencing technology enabled astronauts and flight controllers in Texas to share computer data in real-time, which is critical for decision making.

ProShare connected astronaut Jim Newman to flight ground controller/astronaut Marsha Ivins at the control center in Houston, allowing them to share photographic images on the PC and annotate shared information with words and drawings.

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Pain worth the gain?

Videoconferencing is still mostly for the tolerant. But it is gaining momentum.

By Ram Tackett

Is videoconferencing ready for prime time? Some think so. John Chambers, president and CEO of Cisco Systems, Inc., says technologies such as multimedia E-mail, desktop videoconferencing, distance learning and collaborative computing are ready for the mainstream.

Ready? Yes. Mainstream? Well, not yet. But it's coming sooner than you might think. Desktop videoconferencing is expected to take off by the end of 1996.

Bruce Ryan, a principal analyst with Dataquest, Inc., says the business multimedia market will double from $1.5 billion in 1993 to $3 billion this year. He expects budgets for multimedia to increase an average of 32% each year.

By 1998, videoconferencing will be common. True switching technology will be cheap and affordable. Isochronous LAN services will be available. And desktop machines will be ready: Processors will be built-in and all you'll need is a $40 camera and about $3 worth of software, according to Al Lill, vice president and research director of advanced technologies at Gartner Group, Inc., speaking at a multimedia network conference sponsored by Cisco.

Infonetics Research, Inc. says 16% of desktops are currently equipped for networked multimedia and by 1998 that number will jump up to 45%. By then, you'll need to have videoconferencing in place to remain competitive.

Should you join the early desktop videoconferencing adopters? If you're ready to step up to the plate, be aware that low-quality images, system incompatibility and high cost are standard fare. And the ability to establish a conference involving desktop systems, conferencing rooms and remote telecommuting systems is still mostly a pipe dream.

Ready or not

Despite the limitations, there are certain fields where the gain is worth the pain. Telemedicine provides a case in point.

The Jefferson Cancer Institute (JCI), the research branch of the Jefferson Cancer Center in Philadelphia, has been using Intel Corp.'s ProShare for more than six months. One desktop videoconferencing unit is at the center in Philadelphia, while others are set up at area hospitals, including one at the Lower Bucks Hospital about 20 miles away. With this telemedicine setup, the experts are in the city and the primary caregivers are in the suburbs.

Dr. Jack London, director of the laboratory for applied computing at JCI, says getting started was a snap. The ISDN lines needed to link the facilities were readily available and installing ProShare simply involved the addition of a few boards.

"We're an academic institution," Dr. London says. "With this desktop videoconferencing setup, we can bring the fruits of research into clinical practice. By making this available, the community hospitals can advertise about using the latest cancer treatment available. Patients don't have to travel as far to get the latest treatment. And JCI gets a wider net for clinical trials."

Content problems, however, still exist. "How do you prepare a medical videoconference? How do you get CAT scans in machine-readable form?" Dr. London asks. "This is still not like discussing a patient's case in the hall or lounge."

Getting ISDN connectivity from some other regional Bells is more challenging.

"There's a lot of talk in the industry about plug and play. Well, the current ISDN environment is more like plug and thrash," says Les Wilson, development manager of multimedia communications at National Semiconductor Corp. Often it takes months for installation and configuration. "Are mom -and -pop businesses going to slug their way through technical issues to get this going?" he asks.

Even for the technically astute, establishing a quality conference can be trying.

Creative Labs, Inc. recently demonstrated its ShareVision product at the 21st Century Classroom Demonstration at the Smithsonian Institute in Washington, D.C. The PC3000 desktop system provided a link between the Smithsonian and the Museum of Science and Industry in Portland, Ore., over a standard analog line.

"The only real problem we ran into was getting a good connection," says Mark Root, technology and systems specialist at the Council of the Great City Schools in Washington, D.C. "The PC3000 can connect at up to 28.8K bit/sec, but the best we could get was 19.2K. This gave us around 15 frames per second, which left us with a strobe effect." Thirty frames per second is the norm for television-quality video.

Audio quality is another concern most users share today, says David Tucker, general manager of Incite, a division of Intecom, Inc. Audio must be as good as

Dr. Jack London, director of the laboratory for applied computing at JCI, says getting started was a snap. *"With desktop videoconferencing we can bring the fruits of research into clinical practice."*

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the phone system, which has a latency of about 125 msec. People have difficulty speaking if latency is greater than 200 msec. Typical latency of video systems is between 200 msec and 500 msec. Inconsistent latency degrades audio quality by introducing audible pops and clicks.

Another common user complaint about videoconferencing is you can't mix and match components and systems.

"One problem I have [with Creative Labs' PC3000] is that it's proprietary," Root says. "You had to buy their modem and their video card. But if you can get a 28.8K bit/sec modem cheaper, why buy theirs?"

This lack of interchangeability is particularly limiting when it comes to trying to patch together a videoconference with people using different types of systems.

It may not be that important, though, to ensure that your desktop units can talk to your conference room systems, according to Wilson from National Semiconductor. "The reality is, who cares if I can't get my desktop to talk to the conference room? Desktop communications is spontaneous. Rooms at National Semiconductor are booked two weeks in advance, which doesn't lend itself to spontaneity."

Avistar is among the vendors attempting to integrate the three videoconferencing tiers: conference room systems, desktop video systems and inexpensive units for telecommuters. These systems, however, are not interchangeable with those from other providers, like Intel.

Codec standards/costs

Standards should resolve these long-standing interoperability problems. The major vendors support the H.320 standard for codecs. Using H.320-compliant hardware should enable users to talk to each other regardless of the system manufacturer.

Tucker advises: "Stick to the standards. Make sure [your equipment] will be able to seamlessly interoperate with the WAN. Make sure that you have a good vision of where the products are going long-term. Look at all the options. It's confusing out there."

H.320 is currently an expensive proposition for desktop users, sometimes requiring two to three times the initial investment in the host PC. "Our rule of thumb," Tucker says, "is when the cost of the enhancement is about half the cost of the price of a new PC, that's when mass-market introduction begins."

Perhaps one of the more dramatic developments in the not-so-distant future will be the arrival of software codecs that will bring about "bootstrap interoperability," Wilson says.

Unlike hardware standards like H.320, software-based solutions aren't frozen in silicon and can be shared between systems. People will be able to update the quality of their videoconferencing by updating the software on their system, not replacing the hardware needed to implement it.

Vision of the future

When videoconferencing becomes commonplace, it will be necessary to define "See-mail" etiquette. "We don't worry about any Big Brother aspects with videoconferencing," Wilson says. "But with auto-answer enabled on some of the home units, people might not recognize that the unit is on and could walk through the room in a stage of undress."

Just wait and see what videoconferencing has in store in the coming years. But, please, keep your pants on. ■

Tackett is an industry analyst with Currid & Co., a research and consulting firm in Houston, Texas.

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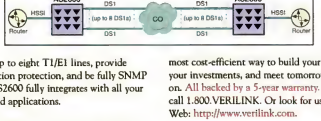

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Circle Reader Service **#26**

Effective teamwork *virtually guaranteed*

Virtual teams can present a management challenge, but the potential rewards are worth it.

By Linda Musthaler

Now you see them, now you don't. They are your employees, and they have joined the revolution of the virtual work force.

Rapidly changing business environments have spurred considerable interest in virtual corporations, which, loosely defined, comprise groups of highly talented people who come and go as projects dictate. Like a SWAT team, a virtual corporation pulls together the best resources to complete a job. The workers might be staff members from different divisions, or they might come from a contracting source or even from the ranks of a vendor.

Although managing such a team can present a challenge, the rewards can be great. Virtual teams are far more flexible than teams of permanent staff members. And since skill sets can be drawn from anywhere, you can pull together the ideal resources to meet your specific needs for a project.

What's more, resource planning headaches can be minimized, as team members are only on staff for as long as they are needed. When their part of the project ends, so does their association with the team.

One great feature of the virtual corporation is that it lets people complete their portion of the work almost anytime, anywhere. Depending on the project, the need for office space and other facilities can be minimized. For instance, many workers pulled into a virtual team choose to do their work at home.

People issues are common

On the downside, people issues often plague the virtual corporation.

Miscommunication and disparate expectations, often stemming from the lack of face-to-ace contact time, are some of the most common problems. As a society, we place a high value on visual and oral cues such as facial expressions and voice inflections. When the virtual team resorts to communicating through electronic mail, for example, these visual and oral cues are supplanted by "emoticons" and accent fonts, which cannot fully convey a message's meaning.

Not too long ago, for instance, a virtual team I was part of wasted a whole day sending E-mail back and forth over an issue that could have been settled quickly had we been face-to-face. Instead, we opted to electronically bang out our feelings, which were misinterpreted almost every step of the way. Strangely, it never occurred to us to pick up the phone and actually talk.

The dynamics of a virtual team are important. You must be sure to assemble people who not only have the right blend of skill sets, but also share similar philosophies and approaches to completing the task at hand.

Currid & Co. learned this lesson a few years ago when writing a guide to corporate computing strategies. One team member had little network experience, so his perspective centered around mainframe-centric computing. All of the other co-authors wrote with network-centric biases. We had violated the basic rule of shared philosophies, and we had to redo some of the work.

In addition, it certainly helps if your team members have the opportunity to share some time together to bond as a group at the outset of a project. Your group will function more smoothly if all the members understand each individual's role

JIM CARROLL

as well as the team's objectives. Don't overlook the importance of bonding. People tend to work better with and for people they genuinely like and respect.

Highly motivated, self-directed people make the best virtual employees. Since virtual team members are likely to be geographically dispersed, you will want to work with people who require minimal supervision and direction. Nevertheless, a project leader should act as the focal point to coordinate the efforts and oversee the results of the individual team members.

The project objectives and the expectations for each team member should be clearly communicated when the group is forming. You don't want to waste valuable time and money by sending someone off in the wrong direction. Just to be sure everyone is on the right track, it is helpful to review project status and milestones often, and to make course corrections early.

As in any organization, compensation for individuals can be a sensitive management issue. The trend is toward paying team members according to the value of their contribution, not the amount of time they spend on a project. It is quite conceivable that the person who spends the least amount of time on the team can walk away with the best compensation — such is the law of supply and demand for specialty skills. Be sure that all team members understand and are comfortable with their own compensation at the start of the project.

Performance evaluation can be another tricky aspect of the virtual team. Since you cannot always see or spend time with your virtual employees, it is important to make adjustments in the way you judge their performance. People's ability to direct themselves is more important than their willingness to take direction. Also, you will need to concentrate more on the sheer results of the work, rather than the process taken to get there.

Technology helps

Technology is usually the cornerstone of a good virtual team. Group members should be computer-literate, at least to the point where they can communicate quickly and easily via E-mail, or, better yet, via desktop videoconferencing. E-mail also can be used to route and distribute documents and work in progress. Make sure you select a communications medium that supports the exchange of binary or native format files.

When selecting technology, be sure that all team members are using similar, or at least compatible, products and applications. Otherwise, too much time can be wasted trying to translate or convert documents and information from one format to another, especially if information from various sources needs to be merged at some point.

Whether or not your virtual team is highly automated, you should have a central repository for work in progress as well as completed work. Moreover, it is helpful to have procedures for checking work into and out of this repository in order to avoid duplication of efforts or overwriting someone's valuable work. In the case of a document-intensive project, such as the design and development of a software application, a document management system can be worth its weight in gold.

Team dynamics take on a different level of challenges for virtual corporations. Those who master the management issues stand to reap the benefits of a flexible workforce. ■

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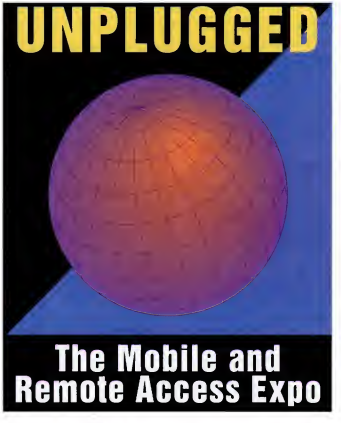

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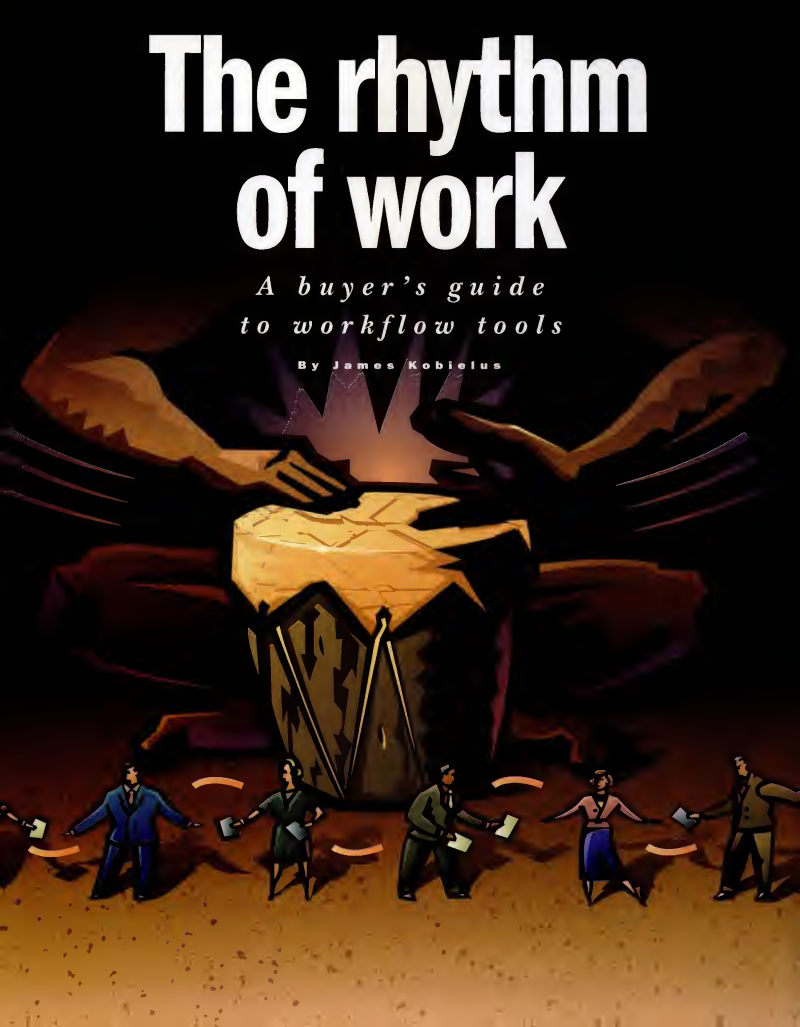
The rhythm of work

A buyer's guide to workflow tools

By James Kobielus



Today's workflow management tools allow companies to tune into the business beat and alter the rythm to gain flexibility and increase speed and efficiency.

MIKE MASON

Every enterprise has a distinctive rhythm, which is expressed in the flow of information, tasks and materiel between people. Sometimes, the rhythm is defined by a master process architect. More often it is improvised without much conscious planning.

Process reengineering is high on many companies' agendas these days, partly because old work rhythms have gotten out of sync with the changing competitive environment. Companies miss out on potential sales when new product designs take too long to flow from R&D to manufacturing. Customers jump to the competition when calls for help are meet with delays or incoherent responses.

Today's workflow management tools allow companies to alter the rhythms and, when used effectively, increase the speed, flexibility and efficiency of network-enabled business processes. Workflow tools support structured routing, review, revision and tracking of documents, business forms and other information.

Dozens of vendors are purveying workflow products for various network platforms, applications and price points. A growing number of workflow applications — including products from Digital Equipment Corp., Lotus Development Corp. and Novell, Inc. — integrate with vendors' groupware products and application suites.

Workflow products have evolved beyond their original vertical-market emphasis on document-image processing, a high-end, heavy-duty application popular with financial, insurance and engineering users. A growing number of workflow applications will route almost any file format, including ASCII text, computer-aided design (CAD) drawings, word-processing documents, spreadsheets, databases, graphics, scanned images and electronic forms.

The lines between workflow, document management, database management and project management applications continue to blur. Many workflow products access server- or host-based file, document and database management systems. Files relating to a particular task can often be routed as a linked "folder" and presented to recipients as a list of pending action items. Multiple versions of a particular document can be tracked by server-based document management systems. Once a process is complete, the contents of a form can be written to shared corporate databases.

Most workflow applications are distributed in architecture. Sun Data, an Atlanta-based systems integrator, chose Keyfile Corp.'s product based in part on its ability to link systems running AS/400, HP-UX, NetWare 3.12 and Microsoft Windows 3.1 over Ethernet, according to Randy Hicks, manager of imaging sales for the company. Another strong point was Keyfile's ability to connect through standard interfaces to E-mail and file services in Novell's server-based GroupWise and PerfectOffice application suites.

Sun Data is using Keyfile to develop an employee performance-appraisal application that taps into corporate document databases to pull together an electronic package of forms and instructions used in the review process, Hicks says.

The application will attach due dates and then route the package to authorized reviewers. Overdue notices will be automatically sent via E-mail to delinquent reviewers, and when the process is complete, the employee's direct supervisor will be sent an E-mail reminder to review the results with the employee. Should bottlenecks occur, a real-time graphical display of the workflow can be consulted to track down the cause.

Workflow-specific standards are nonexistent, reflecting the market's youth, dynamism and technological complexity. The Workflow Management Coalition (WMC), a broad-based vendor consortium, has defined a reference model for ongoing standards development but has not yet issued any finished standard.

Lack of interoperability standards means that users venturing into the workflow market will have to place their bets with a particular vendor's proprietary solution. Applications written to one vendor's programming interface will probably not be able to access process models and work lists supported by another vendor's run-time workflow environment. As a result, it would be difficult or impossible to route and track documents across different vendors' proprietary workflow environments.

Two types of workflow

Available workflow solutions can be grouped into two categories: production and ad hoc.

Production workflow systems automate complex business processes that vary little from case to case, similar to a white-collar assembly line. They support high transaction volumes, shared document repositories and sophisticated document/task tracking. The top vendors of production solutions include Action Technologies, Inc., FileNet Corp., IA Corp., IBM, Keyfile, Recognition International, Inc., ViewStar Corp., Wang Laboratories, Inc. and Xerox Corp.

Many production workflow applications descend from established imaging-based workflow products or from text-based document management and retrieval products. They are typically customized and administered by corporate MIS in support of high-level business-process reengineering projects.

Ad hoc workflow solutions, by contrast, support rapid definition and execution of less complex process models that may be used to facilitate the flow of a single document on a single occasion, or the flow of mainstream business documents on an ongoing basis. These products allow users to route electronic business forms as file attachments over existing E-mail systems.

Not surprisingly, ad hoc workflow vendors include many prominent E-mail companies, including Banyan Systems, Inc., Digital, Fischer International Systems, Lotus, Microsoft, Novell and Verimation, Inc. Other ad hoc workflow vendors include Delrina Corp., IBM and JetForm Corp.

E-mail-based ad hoc tools are well suited to supporting "serendipitous workflow" processes, says Ronni Marshak of the Patricia Seybold Group, a Boston consulting and research firm. Serendipitous workflow involves unstructured processes that emerge from everyday interaction, she says. "Tools [for serendipitous workflow] should be easy to use once, but also reusable, scalable and modifiable for new applications."

Finding the best workflow management systems for your needs involves considering such criteria as platforms, process-design tools, routable-object design tools

Buyer's Guide: Workflow Management Tools

Vendor name, Sales Phone	Product name	Platforms Supported					Networks Supported										Functions											Objects Routed					Price
		Macintosh	MS-DOS	Windows 3.1/95/NT	OS/2	Unix	AppleTalk	DECnet	LAN Manager	LAN Server	NETBIOS	NetWare	SNA	TCP/IP	VINES	Windows NT Advanced Server	Graphical work-process design	Automate document routing	Document check-in/check-out	Document tracking	Embedded commenting/multiple merge	Electronic forms routing	Version control	Mail-enabled applications	Mail messages	Electronic forms	Scanned document images	Compound text/graphical files	Application files	
Action Technologies, Inc. 800-967-5356	Action Workflow			✓	✓	✓											✓	✓		✓				✓	✓						Price per client depends
Adm Systems Inc. 508-937-3700	Matrix 3.0			✓				✓	✓	✓				✓		✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	$35,000 for 20 user license
Dolphin Corp. 800-268-6082	FormFlow 1.1	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓		✓	✓	✓		✓				✓		✓		✓						$399 starter kit
Diamond Head Software Inc. 800-428-6657	ImagisBASIC for ActionWorkflow 1.0			✓					✓	✓		✓		✓	✓	✓	✓	✓	✓	✓		✓			✓	✓	✓	✓	✓	✓	$450 client, $13,890 server
Digital Equipment Corp. 800-DIGITAL	Linkworks 3.0	✓		✓	✓	✓		✓				✓		✓			✓	✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	$199 client, $1,499 server
Digital Equipment Corp. 800-DIGITAL	TeamLinks Routing 2.5	✓		✓	✓		✓	✓										✓		✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	$101 client, $4,286-$16,532 server
Early, Cloud & Company 800-322-3042	Message Driven Processor 1.3			✓	✓				✓	✓	✓	✓	✓	✓				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	$250,000 to $1,500,000
FileNet Corp. 800-FILENET	WorkFlo Business System	✓	✓	✓	✓	✓	✓		✓	✓		✓		✓	✓	✓	✓	✓		✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	$295-$2,500 client, $1,980 server
Fischer International Systems 941-643-1500	WorkFlow 2000			✓					✓	✓	✓	✓	✓	✓	✓			✓		✓		✓		✓	✓	✓				✓	$24-140 client, $19,500 site license
Highland Technologies, Inc. 301-306-8200	HighView2.4			✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓		✓	✓		✓	✓	✓	✓	✓	✓	$12,500 per 6 users
Hyperdesk Corp. 800-TEAMWORK	GroupWorks 1.0			✓						✓	✓			✓			✓			✓				✓	✓			✓	✓		$1,680/workgroup (up to 15)
IA Corp. 510-450-7000	WorkVision 4.0			✓	✓	✓								✓			✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	$800 client, $15,000 server
IBM Software Solutions 800-IBM-CALL	FLOWMARK			✓	✓						✓			✓	✓		✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	$695 client
Identitech 407-951-9503	FYI Enterprise 2.5			✓			✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Variable price
Information Mgmt. Consultants, 703-893-3100	ImagisMover 2.3			✓		✓		✓						✓				✓	✓	✓		✓			✓	✓	✓	✓	✓	✓	$2,500 client
Intelus Corp. 800-228-6363	ProcessFlo 5	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓			✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	$995/seat
Interleaf 800-955-5323	Interleaf Intellecte 1.2	✓		✓		✓		✓	✓	✓	✓	✓		✓	✓			✓	✓	✓	✓		✓			✓	✓	✓	✓	✓	$600/user
JetForm Corp. 800-267-9876	JetForm	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓			✓				$89-$149 client, $835-$9,450 server
Keyfile Corp. 800-4Keyfile	Keyfile 3.0			✓	✓	✓			✓		✓	✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	$795 client, $7,995 server
Logical Software Solutions Corp. 301-474-0285	FLOWMAN 1.11b		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	$325-425 client
Lotus Development Corp. 800-828-7086	LotusNotes 3.3	✓		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓		✓	✓			✓		✓	✓	✓	✓	✓	✓	✓	✓	$275 client
Microsoft Corp. 800-426-9400	Electronic Forms Designer 1.0			✓				✓	✓	✓	✓	✓		✓	✓	✓		✓				✓					✓			✓	$495 + VisualBasic
Network Imaging Corp. 800-254-0994	1View:Workflow 1.5			✓		✓								✓			✓	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓	$245 client, $18,590 server
Novell, Inc./GroupWare Division 800-861-2507	InForms 4.1	✓		✓			✓		✓	✓	✓	✓		✓	✓	✓								✓	✓	✓	✓	✓	✓	✓	$495 client
Optika 719-548-9800	PowerFlow 1.3			✓					✓	✓	✓	✓		✓	✓	✓	✓	✓			✓	✓					✓	✓	✓	✓	$900-$1,700 client
Portfolio Technologies 800-626-7711	Office.IQ 2.1			✓								✓					✓		✓	✓				✓				✓	✓	✓	$495 for 5-user license
PowerCorr 813-226-2378	FlowBuilder 4.0			✓					✓	✓	✓	✓		✓	✓	✓	✓							✓	✓	✓	✓	✓	✓	✓	$1,099 client, $14,999 server
Recognition International, Inc. 214-579-6390	Plexus FlowWare 3.0	✓	✓	✓	✓	✓								✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	No price given
Saros Corp. 800-82-SAROS	Saros Document Manager 1.5	✓	✓	✓	✓	✓			✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	$495 client
Staffware Corp. 617-239-8221	Staffware 5.1.H3	✓		✓		✓			✓	✓		✓		✓	✓		✓	✓	✓	✓		✓		✓	✓	✓	✓	✓	✓	✓	$975 per user
Template Software, Inc. 703-318-1000	Workflow Template 3.0			✓	✓	✓		✓						✓			✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	No price given
Trinzic Corp. 617-891-6500	InfoPump 1.2			✓	✓	✓			✓	✓		✓	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	$25,000
Verification, Inc. 800-967-6366	MEMO/FORMS 5.1	✓	✓	✓	✓		✓		✓		✓	✓	✓	✓				✓	✓	✓		✓		✓	✓	✓	✓			✓	$30 client, $25,000 server
Vidya Technologies, Inc. 617-497-7150	ThoughtFlow 1.0			✓					✓	✓	✓	✓		✓		✓	✓	✓		✓					✓					✓	✓	$299-$99 client, $199 server
ViewStar Corp. 800-353-3517	ViewStar System 4.1			✓		✓				✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				✓	✓	✓	✓	$3,000/user for 500 users.
Wang Laboratories, Inc. 800-639-9264	OPEN/workflow for Unix 2.0			✓									✓	✓			✓	✓								✓	✓	✓		✓	Prices varies
XSoft Division of Xerox, 800-428-2995	InConcert 3.0			✓		✓						✓		✓			✓	✓	✓	✓		✓	✓		✓	✓	✓	✓	✓	✓	$395-$995 client, $14,000 server

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and ease of use and administration.

Platform

Determining if your environment can accommodate a specific workflow tool requires more than simply checking for compatible hardware, operating systems, transport protocols and network connections. You must also examine the file systems, database servers, E-mail systems and directory services that sustain a distributed information-sharing environment.

All workflow tools run on Microsoft Windows desktops, although support for Macintosh, Unix and OS/2 environments is also widespread. Due to the market's client/server orientation, less than a handful of products run on mainframe or minicomputer operating systems. Users who want to hub their workflow around big data center metal might explore offerings from Fischer International Systems, Information Management Consultants, Inc. and Verimation.

Support for TCP/IP networks is almost universal among workflow offerings, enabling workflow products to interoperate to varying degrees over the Internet. NetWare is supported by 80% of the products surveyed, while more than 50% run on the other leading network operating systems (NOS): Banyan Vines, IBM LAN Server, Microsoft LAN Manager and Microsoft Windows NT Advanced Server.

Architectually, all production workflow applications are built around the concept of a shared electronic filing cabinet. They rely on NOS services — including database, file, directory and security management — to ensure efficient task and document routing over the local or wide area. Most let users automatically launch the appropriate application to work on a document that has been routed to their workflow inbox (which is sometimes known as a work list and is usually separate from any E-mail inboxes users may have).

Structured Query Language (SQL) databases are at the heart of most production workflow products. They are used to maintain underlying workflow process models and track ongoing tasks. They are also used to store the data of the business documents and forms that are routed through the system. Most production workflow products interface to market-leading DBMSs, through SQL, Open Database Connectivity (ODBC) and other interfaces.

Production workflow systems designed to track the flow of CAD drawings and other engineering documents are referred to as product data management (PDM) solutions. Adra Systems, Inc.'s Matrix, Autodesk's WorkCenter and Hewlett-Packard Co.'s WorkManager fall into this category.

Messaging services are used within production workflow environments primarily for user notifications, reminders and alerts. Most interface to one or more of the market-leading E-mail systems, including Lotus cc:Mail and Microsoft Mail, through standards such as MAPI, VIM and MHS. Interfaces to Lotus Notes, Internet SMTP and X.400 mail systems are supported in some products.

By contrast, ad hoc workflow products use messaging systems as the primary routing mechanism for all documents. The routing list is usually carried within the message itself. Process logic is executed within the workflow client application, which uses messaging APIs to forward a document to the next user in the routing list. Unlike production workflow products, ad hoc tools seldom have a server-based workflow engine to maintain process models, enforce routing rules, and track document locations and status.

Microsoft recently submitted a proposal to the WMC that, if it bears fruit, could provide an industry standard for document tracking across multivendor, mail-centric, ad hoc workflow environments. Microsoft has proposed MAPI extensions that will facilitate identification of originators, routing lists and process status by mail-based workflow applications. It will publish a final proposal by the end of the year.

Process design tools

Process design tools enable users to define workflow participants, roles and privileges, routing paths, and business rules associated with the processing of electronic folders or documents.

One way to tell production from ad hoc workflow solutions is the presence of process-flow-charting tools. Most production workflow vendors provide sophisticated flow-charting capabilities, generally in the form of visual programming environments and scripting languages.

Flow-charting tools should be evaluated on the basis of intuitive design, conceptual clarity and ease of specifying, examining and revising workflows.

A process tool for the serious workflow developer is Action Technologies' Action Workflow Analyst. Action requires developers to adopt its conceptual framework for workflow processes, which involves four stages: preparation, negotiation, acceptance and performance. Once you've adopted this framework, Action's tools help you remap your business processes around TQM principles.

Predefined task libraries make workflow design a snap, and ViewStar boasts one of the best libraries. ViewStar 4.0 provides a well-designed set of icons for such common tasks as document review, reminders and decision branching, as well as tools for defining custom tasks. In object-oriented fashion, workflows and any piece thereof can be reused as subprocesses within new processes.

A bit simpler but no less elegant is Keyfile's JobMaker tool, which allows workflows to be defined with drag-and-drop "job step" icons that carry names such as "FYI," "response," "split path" and "done." Linking activities within Keyfile's work map is as easy as drawing lines between activity icons, indicating inputs and outputs.

Even more intuitive is Portfolio Technologies' Workflow Illustrator, a component of its Office.IQ product. Workflow Illustrator allows workflows to be defined as graphical networks of people or positions, rather than abstract tasks. After the basic workflow map is defined, various routing rules can be attached to links, based, for example, on particular values in fields of business forms sent over that link.

Flow-charting tools are almost totally absent from the ad hoc workflow market (the lone exception being Digital's LinkWorks, which allows routing lists to be defined within an on-screen organization chart). Most ad hoc tools use a routing slip interface, similar to E-mail addressing conventions, to support process definition.

Ironically, dynamic rerouting is unavailable in the ad hoc workflow market. This capability is not to be confused with conditional routing, supported by all production and ad ho workflow vendors, under which documents, obeying predefined rules, are routed alternately depending on recipient actions and other run-time events.

What enables ad hoctools to support impromptu workflows are the simplicity of their routing-slip process-definition interface and their integration with ubiquitous E-mail systems.

Routable-object design tools

A routable workflow object can be as complex as an electronic folder containing sundry scanned images, database extracts and application files or as simple as a one-page business form. Workflow tools should be evaluated for their ability to support design of complex, routable objects imported from various applications, since most

Enterprise hooks

Workflow tools are only as good as the company they keep. One of the more critical things to look for when evaluating products is how and what enterprise mail, groupware and database environments they can be integrated with.

Vendor name	E-mail (e.g., Lotus, cc:Mail, Novell Global MHS, Microsoft Mail/Exchange)	Groupware (e.g., Lotus Notes, Novell GroupWise, Digital TeamLinks)	RDBMS (e.g., Oracle, Sybase, Informix)	Internet application services (e.g., Internet Mail, Internet News, Gopher, FTP)
Action Technologies	✔	✔	✔	
Adra	✔	✔	✔	✔
Delrina	✔	✔	✔	
Diamond Head		✔	✔	
Digital (Linkworks)	✔	✔	✔	✔
Digital (TeamLinks)		✔	✔	
Eastly Cloud	✔	✔	✔	
FileNet	✔	✔	✔	
Fischer				
Highland	✔	✔	✔	
Hyperdesk	✔			
IA	✔	✔	✔	✔
IBM	✔	✔	✔	
Identitech	✔		✔	
Information Man.		✔	✔	✔
Intelus	✔	✔	✔	✔
Interleaf	✔	✔	✔	✔
JetForm	✔	✔	✔	
Keyfile	✔	✔	✔	
Logical Software	✔	✔	✔	✔
Lotus	✔	✔	✔	✔
Microsoft	✔			
Network Imaging	✔		✔	
Novell	✔	✔	✔	
Optika			✔	
Portfolio				
PowerCerv	✔		✔	
Recognitron	✔	✔	✔	✔
Saros	✔	✔	✔	✔
Staffware	✔	✔	✔	
Template			✔	
Trinzic	✔	✔	✔	
Verimation	✔	✔		
Vidya		✔		
ViewStar	✔	✔	✔	
Wang	✔	✔	✔	
XSoft	✔	✔	✔	

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real-world business processes incorporate documents from multiple sources.

Most production workflow systems support creation of multi-document folders, a task facilitated by embedded document indexing and retrieval mechanisms.

Vendors with sophisticated folder management capabilities include Autodesk, CabiNet, Digital, HyperDesk, IA, Identitech, Intelus, Interleaf, Keyfile, Logical Software Solutions, Optika Imaging Systems, Portfolio Technologies, ViewStar, Wang and Xerox.

Workflow folders provide users with custom views into a shared document repository. These views can be tailored to a user's specific role, access privileges and tasks. Routing a folder to the next user in the workflow may involve copying the constituent files to that person or simply transferring access privileges. Files and their associated applications may be auto-launched with mouse clicks from the workflow desktop interface.

An electronic form is one type of object that can be slipped into these folders. Forms-design tools are provided by several production workflow vendors, including Identitech, IA, IBM, Logical Software Solutions and ViewStar, as well as by all ad hoc workflow vendors. These products support visual definition of form layout, graphics, data fields, input ranges, access controls, internal calculations, signature requirements and other attributes. Generally, these are sophisticated design tools among which there is little difference in functionality or usability.

Logical Software Solutions and Keyfile support import of forms from third-party packages, such as Novell InForms, JetForms or Delrina FormFlow. Keyfile also provides a feature, called Type-Matic, that allows form fields to be drawn over a scanned or imported text form to contain and manipulate filled-in information.

Recognizing that serious corporate users will want to build custom workflow applications, most production and ad hoc tool vendors provide application programming interfaces (API) for linking programs written in C and C++, as well as with popular third-party development tools such as Visual Basic and PowerBuilder. External program interfaces allow companies to put a custom face on their applications.

Ease of use and administration

A workflow environment's usability depends, of course, on the quality of applications developed for it. However, some products make it easier to build user-friendly workflow applications, based on such criteria as ease of initiating and controlling workflows, accessing routed objects, launching associated applications and tracking documents in process.

Production workflow products allow developers to idiot-proof applications through support for hard-wired business rules. Workflow applications prompt users to follow the official business process, and no alternative course of action is permitted. This may be all the user-friendliness necessary for many applications.

When dynamic rerouting is required, however, users should be provided with tools to track and control processes in real time. A growing number of production tools use the same graphical map for process definition and document tracking, enabling users to identify a document's location through color-coding or some other visual element. Vendors supporting this capability include IA, Keyfile and Portfolio Technologies.

From a usability standpoint, ad hoc workflow products have the advantage of being able to route documents to and from users' E-mail boxes. Production workflow systems, by contrast, create separate inboxes and outboxes, which are often referred to as work lists. Workflow developers should think twice before burdening users with the need to check E-mail for some inbound items and work lists for others.

Ease of use makes ad hoc tools a good entry-level workflow solution for companies wishing to automate simple, forms-based processes. Ad hoc solutions let users build routing lists from entries in the E-mail system's directory or address book. Documents, which may be created with existing applications or extracted from SQL databases, are transported as E-mail file attachments.

Hallmarks of a well-designed ad hoc workflow product are the ability to distinguish workflow objects from normal E-mail in the recipient's inbox and the ability to automatically launch applications by clicking on the file/message name (the latter capability is already standard in most production workflow systems). These capabilities are supported in Banyan BeyondMail, Novell InForms, Delrina FormFlow and Microsoft Electronic Forms Designer.

Microsoft's product supports development of E-forms as custom message types within Microsoft Mail. E-forms are viewers that can be installed once on a user's Microsoft Mail client. Routing a filled-out form causes only the data — not the format — to be transferred to the next recipient, who can read it by simply clicking on an E-forms icon in their Microsoft Mail inbox. Data may be imported into an E-form from other applications using SQL, OLE and binary and ASCII file transfers.

All production workflow products have good, solid, built-in document-tracking capabilities. The client-centric architecture of ad hoc tools, on the other hand, makes document tracking a bit tricky, especially when items are routed through multivendor mail systems.

"Electronic forms [or ad hoc workflow] companies have very simplistic routing models and either don't implement tracking or only in a kludgy way," says Bruce Silver, principal with Bruce Silver Associates, a workflow consultancy in Weston, Mass.

One tracking approach, used in Lotus Forms and JetForm, is to monitor changes to a central document database that are made when users update forms associated with that database.

Another tracking approach, used in Lotus Forms, is for a recipient's workflow client to automatically send notification messages to the originator when changes are made or actions are taken on a document. Verimation's MemoForms uses the similar approach of posting process-status information to a bulletin board, where it can be viewed by authorized users.

Conclusion

Any company that's serious about business process reengineering should be exploring today's workflow management tools. Solutions range across the spectrum, from simple forms-routing tools to full-blown production systems. Absent intelligent planning and application design, none of these tools can make your company function better. If you're not careful, you're likely to automate a bad process and thereby carve it into stone.

Used properly, however, workflow applications can be powerful tools for reinventing your organization. ■

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····· short list ·····

The Short List highlights workflow management products that Collaboration recommends you examine during the purchasing process. Workflow applications included here meet the following criteria: Microsoft Windows client interface, embedded MAPI, VIM, and/or MHS E-mail client, process-flowcharting tool, forms-design capabilities, multimedia-foldering capabilities, and structured routing and dynamic rerouting capabilities.

WorkVision *IA Corp.*

WorkVision is a production-oriented workflow platform that supports dynamic rerouting for exception processing. The product can be scaled up to support growing workloads across an unlimited number of workflow engines. Its distributed object database allows workflow engines or individual engine processes to be replicated and distributed seamlessly over LANs and WANs. An embedded document management subsystem provides a graphical forms-design tool, folder-definition tool and repository browser, incorporating drag-and-drop functionality and third-party document viewers. Workflow processes can be defined through graphical links between work queues, which generally correspond to specific users. Workloads can be balanced across distributed servers without sacrificing centralized control and monitoring.

Keyfile 3.0 *Keyfile Corp.*

Keyfile is a production workflow system with user-friendly graphical process-definition and document-tracking tools. The product has strong document management capabilities, including multimedia file/folder definition, multilevel version control, reference filing, object-level security and extensive markup and page-manipulation functions. Clicking on a workflow document from within Keyfile automatically launches the appropriate viewer or, if present, third-party application. Notifications and alerts can be E-mailed to workflow participants through VIM, MHS, and UUCP gateways. The package supports forms import from third-party packages, as well as definition of forms fields over a scanned or imported text form.

FlowMan *Logical Software Solutions Corp.*

FlowMan is a fully distributed production workflow package that operates completely on the client. It can be integrated with any document management system, imaging system, or other application that supports Dynamic Data Exchange (DDE) or Dynamic Link Library (DLL) calls. Forms, with associated data-validation rules and database linkage, can be imported from third-party packages and registered with FlowMan. A full range of sequential, parallel and conditional routing rule can be defined within FlowMan. Work items are organized and presented in a case/folder/document hierarchy. The product provides a full set of standard queries, reports, and graphs to track, measure and optimize work in progress.

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Wanted: Good, cheap Web space

Renting a Web site can get you up and running fast. Here are 10 questions to ask before you sign on the dotted line.

By Douglas E. Welch

So, you have heard that the World Wide Web is fast becoming the quintessential business tool for companies that want to give customers ready access to information and foster communication with them. You are ready to enter this electronic labyrinth, but since you are no Web master, you are worried about getting lost in the maze.

The concern comes with good reason –hundreds of companies are creating a presence on the World Wide Web every day, and thousands more are considering it. A lackluster, poorly designed Web site can turn a potentially powerful business tool into a real dud.

Web sites don't come cheap either. Setting up a site can mean a major capital outlay, so it is advisable to test the waters by renting space rather than installing your own Web server. You can rent space from dedicated Web and some Internet services providers, for instance.

Services and costs vary widely from provider to provider, so it is important to know exactly what you are getting before you sign a contract. Get your Web provider candidates to answer the following 10 questions, and you will find your decision a bit less daunting.

1. *Do you design pages in addition to implementing and maintaining the Web site?*

Part of the Web's appeal is eye-catching pages, so a site should be visually pleasing. Recognizing this, some Web providers focus on their creative talents. They design the look and feel of the site, then implement and maintain it.

These services are often costly. Depending on the complexity of the Web pages, they can run from a couple of hundred to thousands of dollars per month. So if a company has the internal staff capable of developing good-quality Web pages, using this type of Web provider may be overkill. It would be less expensive to contract with a provider that sells and maintains space and leave the creative tasks to internal resources.

2. *Do you register the company's unique domain name with the InterNIC?*

Initial setup fees for a Web site account for the time and knowledge it takes a provider to prepare the proper directories and accounts. Some Web service providers charge an additional amount for registering your unique domain name, like www.company.com, with the InterNIC.

3. *How much disk space do you provide?*

Most providers charge a flat fee for a given amount of hard disk storage. For instance, Clever Computers, Inc., a Web services provider in Atlanta, charges $30 per month for up to 10M bytes of storage. This should be sufficient for most sites unless they contain a large amount of graphics files. Separate charges apply for additional storage.

4. *Do you impose a charge for network traffic?*

Some Web providers charge a fee for the data that flows between the Web site and those who access it. They allow a base amount of traffic for a flat monthly fee–1.5M bytes of traffic per month in the case of Clever, which is typical of other providers. Overage incurs an additional fee, such as the 10 cents per megabyte that Clever charges.

5. *What utilities are provided in the basic subscription price?*

Each Web site should have access to basic utility programs and services that complement Hypertext Markup Language (HTML) documents. Some providers will install several basic Common Gateway Interface (CGI) programs, which extend the capabilities of Web sites and allow a much richer user interface, for use by all their customers. These often include a forms-creation package; an image map program, which provides for graphics that contain hot spots that link to other pages; database and search engines; and guest book utilities.

In addition, some providers let subscribers install custom CGI scripts on their

individual Web sites.

6. *Do you charge extra for high-end services such as secure commerce and chat areas?*

Most providers charge extra for services like secure commerce, discussion groups and chat areas. Even if your site does not immediately need such advanced services, it is important to be aware of your provider's policy in case your site grows or changes focus.

7. *What type of usage tracking do you provide?*

Another important aspect of any Web site, especially those dealing with advertising or sales, is usage tracking. This helps companies determine exactly who is accessing the Web page, what they are viewing and how often they view it. All Web servers provide a log showing each file and graphic transferred from the site, but these logs can often be difficult to understand.

8. *Do you provide reports or just usage data?*

Many providers have installed usage logging programs that output summary and detail reports. If the provider's tools-

Most Web site providers charge extra for services like secure commerce, discussion groups and chat areas.

do not provide adequate reports, then the subscribing company has to customize its own.

9. *Do you include Internet mailboxes in the monthly fee?*

Each Web site usually will need one or more electronic mail addresses to handle correspondence and feedback.

Clever, for example, allows for up to three separate E-mail addresses for the standard monthly fee. These addresses are used to collect information from comment forms or "mailto:" hyperlinks that let users quickly send mail to the site manager.

10. *Do you provide list servers, or auto-responders, for mailing lists and information?*

List servers let companies send information to mailing lists so that users of the Web site can receive newsletters, updates and even carry on a discussion, as they would in a bulletin board or Usenet news group. Links can be provided on the Web page that automatically add users to these mailing lists.

Auto-responders and info servers allow the Web site to automatically send out information in response to incoming E-mail. ■

Welch is a free lance writer and creative technologist for Entertainment Communications Network in Studio City, Calif. He can be reached at dewelch@earthlink.net.

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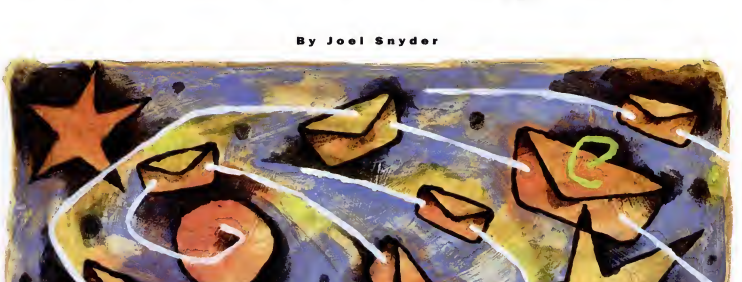
Roadblocks to E-mail convergence

By Joel Snyder



JIM GRYDER

There is a new urgency to link E-mail systems that is reminiscent of the nations' drive to link railroads East to West, highways far and near.

Electronic mail convergence will ultimately result in the creation of a single worldwide network that promises to ease cross-company, cross-industry and even cross-country collaboration.

Once a tool used simply to transport missives, E-mail has blossomed into a messaging bus for all sorts of communication. Mail systems now carry scheduling system messages, batch job information, system and network management alerts, and non-text messages such as faxes and executable programs.

Managers once content to get mail back and forth are now using terms such as manageable, reliable, efficient and fast when describing their ideal system. Growth of E-mail within organizations has led to a corresponding growth in interorganizational communications.

But there are many roadblocks to mail convergence, including a confusing array of options for tying desktop systems to mail backbones and global transports such as the Internet.

Network executives who want to speed the linkage of their corporate mail systems with the world must consider client/server architectures, backbone technologies, multimedia E-mail, protocol standards and more powerful clients.

Client/server scales

E-mail convergence implies more users and more traffic, both of which can cause performance problems.

The majority of LAN-based E-mail systems use file sharing to move messages from the server to the workstation. In this scheme, E-mail data is read from a LAN server disk using file system primitives. Although this technique is simple and works transparently across many different kinds of servers, it scales poorly and seriously hampers remote access to E-mail.

To serve very large numbers of users and handle the needs of remote users, vendors are turning to client/server mail systems. With client/server E-mail, data is read from the server using mail system primitives, rather than file system primitives.

This lets the client manipulate mail messages using higher level operations (such as "get a message" or "delete a message") rather than low-level operations of a file system (such as "open a file," "seek to a record" or "delete a record"). For most LAN E-mail systems, client/server, when properly implemented, can offer better performance and higher throughput.

An additional benefit of client/server mail systems is support for remote users. With most file sharing mail systems, remote access is slow, expensive and requires great management overhead. A truly mobile user, who may wander in and out of offices around town and around the country, will find current offerings intolerable.

Because client/server mail systems use high-level operations to maintain the mail databases, it is almost as easy to extend the E-mail database through a phone line as through a LAN connection.

Client/server mail architectures are rare now. Pioneering client/server products, such as Digital Equipment Corp.'s Teamlinks, are often clouded by their association with older centralized office automation systems.

Lotus Development Corp.'s Notes, probably the best-known client/server system, has no such stigma. Although Notes is much more than an E-mail system, Notes Mail is pushing the envelope as a state-of-the-art client/server application.

Lotus' direction, however, is still unclear. With a massive installed base of cc:Mail (Lotus' file sharing E-mail system), Lotus will not be able to roll out client/server technology without major objections.

Microsoft Corp.'s Exchange, the just-released replacement for Microsoft Mail, has a potentially strong niche with existing customers. However, its lengthy delays and buggy beta period have done little to bolster confidence among Redmond-centric network managers.

Real backbones are important

Few organizations have a single desktop mail system. A hodgepodge of systems, gateways and transports are more typical, linking new, old and very old systems to each other and to larger networks external to the organization. To provide reliable connectivity with support for multimedia E-mail, a mail backbone is a must.

An E-mail backbone connects directly to each local E-mail system and any external system (such as the Internet, BITNET or X.400). By providing a single method of attaching each mail system to the central backbone, management of mail routing is simplified, and the ability to track and manage E-mail in transit is enhanced.

Unfortunately, many backbones are little more than centralized gateways between mail systems, paying only lip service to the idea of a backbone. For example, LAN-based E-mail systems typically use "backbones" to move mail between servers (called "post offices"), only grudgingly passing it on to the corporate backbone at the last possible minute. This type of half-implemented backbone doesn't encourage tight management and accountability of the E-mail system.

The right backb

Selecting a good backbone is a key factor to a successful E-mail convergence project. All E-mail backbones are not the same. While they tend to be pigeonholed into "X.400" or "Internet" style, there are significant differences that cannot be discerned from a two-page glossy brochure.

Differentiating backbones and their capabilities requires lengthy analysis and testing in your own environment. Although backbones now reasonably move mail between systems without much problem, features to look for are directory synchronization, management and multimedia E-mail.

One especially sore spot with LAN E-mail systems is directory synchronization — keeping the lists of users on each post office and the routing between them updated. Although managing directory synchronization within a LAN E-mail system is no picnic, propagating directory and routing information across a backbone is even more difficult.

No E-mail backbone product does a comprehensive job of automatically propagating and reconciling directory information across all the common E-mail systems. Standards such as the ITU X.500 Recommendations can help in the synchronization task but are not sufficient. Vendors of LAN-based mail systems have strong ideas about how directories should be synchronized, and typically, the backbone must bend over backward to accommodate these expectations.

E-mail management is a second critical factor in differentiating mail backbones. Current backbone products do not offer easy cross-platform and remote management. International standards are being developed to fill this need. The Mail and Directory Management Working Group of the Internet Engineering Task Force (IETF), also known as MADMAN, is developing standard Management Information Bases (MIB) that will allow a network manager to monitor E-mail systems for blockages and problems with the same tools that are currently used to monitor network hubs and routers.

Multimedia is expected

Most E-mail systems easily support transfer of non-text information, such as word processed documents, spreadsheets, graphics and other file formats –but only within the same E-mail system. To achieve true convergence of E-mail networks, these non-textual messages (usually called "binary attachments") must survive a trip through the E-mail system intact.

Simply moving these documents around unmolested is no longer considered sufficient. As personal computers have come to dominate the corporate desktop, E-mail systems are now expected to not only transfer binary attachments correctly, but also to convert them from Novell, Inc. WordPerfect to Microsoft Word before delivery to a Word-addicted user.

Supporting multimedia using an E-mail backbone is possible, but it takes planning and designing. Because the standards for distributing binary attachments are incomplete, interorganizational E-mail using either X.400 or the Internet can be problematic.

Both the Internet's MIME and X.400's Body Part 15 (BP 15) describe how to encode and label attachments for transfer through E-mail networks. Neither has yet accumulated a sufficient registry of agreed-upon labels to ensure complete interoperability.

Surprisingly enough, the software that made binary attachments a requirement handles them the worst. The most popular LAN-based E-mail packages do not easily gateway binary attachments to backbones.

No E-mail backbone product does a comprehensive job of automatically propagating and reconciling directory information across all the common E-mail systems. Standards help, but are not sufficient.

In the world of Microsoft Windows, users have to know the format of a file a priori, typically by looking at the file name extension. Thus, a file called FOOBAR.GIF is probably a Graphical Interchange Format (GIF) file. Because file name standards vary from version to version of a program and from site to site, it is up to the network manager to map file name extensions to multimedia-type information (and vice versa) so that the file can be easily viewed by the recipient.

Network managers will need to monitor carefully the state of standardization and industry practice for MIME types and X.400 BP 15 to ensure that the mapping tables in their LAN and backbone E-mail systems are current and accurate.

Standardized protocols

By definition, a worldwide E-mail network is going to contain a lot of different kinds of E-mail systems and many incompatible E-mail protocols. To ease the pain of linking so many diverse systems, rigid and fanatical adherence to standards will be required.

There is no room in a massively connected E-mail network for a proprietary protocol, no matter how powerful. There are two dominant E-mail backbone protocols: TCP/IP's RFC-822+MIME in the U.S. and X.400 in Western Europe. This dual-standard has led to a variety of anomalies in otherwise sane organizations.

For example, some organizations have chosen to build dual-protocol backbones. Typically, dual protocols are installed for political rather than technical reasons, although the limitations of some E-mail client software sometimes make it difficult for users to cross from the TCP/IP domain into the X.400 domain (and vice versa) without a dual-protocol backbone.

In theory, the internal protocol in an E-mail backbone is irrelevant. It could be X.400, RFC-822+MIME or some highly proprietary set of protocols. If a backbone uses one of the standards internally, then it will be simpler to connect it to an X.400 or TCP/IP E-mail network.

Technically, X.400 offers a wider variety of supported message-processing options than RFC-822+MIME. But the lack of support for advanced messaging features in most X.400 implementations has made most of these X.400 backbones no more functional than their under-defined RFC-822+MIME brethren. Nevertheless, X.400-based backbones have a clear marketing edge because they can – in theory –offer greater messaging possibilities than RFC-822+MIME backbones.

While it is too early to write X.400 off, the pervasive use of the Internet as the connecting glue in the worldwide E-mail network has given an enormous boost to RFC-822+MIME backbone products. Vendors claim RFC-822+MIME backbones make blending private and public E-mail systems simpler. Nevertheless, X.400-based E-mail systems, particularly backbones, have a strong and devoted following and are unlikely to disappear from the market.

Conclusion

Convergence promises to extend the power of inter-personal messaging beyond simple memos and beyond your own organization. The cost is increased traffic, additional management and elevation of E-mail to a mission-critical part of the business. Preparing your organization for mail convergence means making the right choices now and planning for future change.

Medium to large organizations adopting file-based E-mail systems (such as Microsoft's MS-Mail or Lotus' cc:Mail) must plan a jump to client/server as soon as the technology is stable. An E-mail backbone and client software that supports multimedia messaging is a critical factor in future growth and capabilities. Merging E-mail domains, particularly over the Internet, calls for a backbone that can support SMTP and X.400 interfaces. ■

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COLLABORATUS *To have labored together*

Sometimes it takes something more than a detailed financial justification to get the groupware go-ahead.

Groupware as Infrastructure

BY JEFF HELD

One of the questions I get asked all the time is: "How can I justify the investment needed to deploy Notes (or some other groupware product)?"

This can be difficult because groupware products don't always line up with a particular business requirement or application, and a large-scale groupware rollout is expensive. Here are some approaches that I have found successful:

The killer app

Sometimes, an individual groupware application is so compelling that it can justify the infrastructure investment all by itself. For this to happen, the following things must be true:

- The application must address an area that is considered a critical problem by management.
- The requirement is such that conventional technology will not satisfy it.
- The problem must be measurable, so that improvements will be readily apparent.
- The business benefit of the application must be obvious to users.

In my experience, the killer app usually has something to do with sales or customer service. Sales tracking, sales reporting, contact management, customer service, technical support and product marketing are all areas where a groupware application can produce immediate improvement and get the attention of senior management.

I have also found it is easier to justify a groupware investment if the resulting application is linked to revenue increases as opposed to cost savings. In some cases, a financial argument is not even necessary. Most executives will readily agree that a dramatic improvement in cycle time will have significant business benefits and thus not require a financial justification.

BILL THOMPSON

The culture argument

Sometimes groupware is used as a vehicle to change how an organization works. Many large companies are trying to improve their sharing of information and management of knowledge. In this case, groupware can be positioned as an enabler, a necessary component of the infrastructure needed to support the new corporate culture.

This argument is powerful and avoids the whole issue of financial justification. However, since corporate culture changes are generally driven by top management, it is necessary for senior executives to buy into the groupware notion.

For example, the culture argument was the clincher in Ernst & Young's decision to deploy Lotus Notes. We did not attempt to make a cost savings argument. Instead, Notes was viewed as a vehicle to build the knowledge sharing culture our top management wanted, and in fact, the decision to deploy Notes was ultimately made by our management committee and chairman.

Infrastructure thinking

Another approach is to position groupware as part of the organization's technology infrastructure. Since groupware is inherently a network-based service, it is logical to put it in the same category with file and print services, and the like. This argument is also useful because it establishes the linkage between groupware and the need for a solid network infrastructure.

The problem with this argument is it requires senior management to make a leap of faith, that this infrastructure investment will yield some business benefit down the road. Some organizations believe in infrastructure investments without specific financial justification, and some don't. The success of this argument depends on how your management approaches these decisions.

The guerilla approach

The guerrilla approach is probably the most common way for groupware projects to get started. A guerrilla project is usually started when an individual business unit decides to bring in groupware to solve a problem.

The initial application is usually small in scale, and the project frequently happens without anyone at headquarters knowing about it. If the initial project is successful, it is expanded in scope and then begins to take on a life of its own as people in the organization hear about it and want to be added to the system.

The danger of a guerrilla project is that it can be too successful and expand beyond the capability of its initial sponsor to manage it. This has happened many times with Lotus Notes, for instance, and usually results in a costly redesign of the system when it outgrows its original function. The trick in managing a guerrilla project is knowing when to stop. At some point, expanding the guerrilla project is going to have to be justified, and at that point it is no longer a guerrilla project.

The dangers of ROI

The last point I want to make is about the dangers inherent in a purely financial justification. Because groupware is typically not focused on a specific application or process, I have found it very difficult to perform an ROI analysis that is credible. In fact, most ROI analyses of groupware that I have seen have looked pretty shaky and would probably do more harm than good.

Lotus, for instance, distributes a study about Notes ROI that contains some pretty eye-popping numbers. After reading through the study, I concluded it wouldn't pass muster with most of my clients. I prefer to measure parameters like cycle time because it's much easier to do and much easier to prove that a groupware application contributed to a cycle time reduction.

This approach is also in line with an emerging management concept known as the balanced scorecard, which is a different way to measure corporate performance. The balanced scorecard approach recognizes that non-financial measures are an important indicator of the health of the business and need to be given equal weight with the traditional financial measures.

Measures such as customer satisfaction, time to market and other non-financial yard sticks may in fact provide a better picture of the overall health of the organization, and tying groupware investments to these measures can be very effective.

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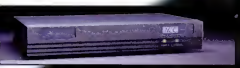

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Circle Reader Service # **31**

Transparency key to multiprotocol over ATM

By George Swallow

Since most networked applications today run over Layer 3 protocols such as IP or Novell, Inc.'s IPX, it is desirable that those protocols be seamlessly transportable across Asynchronous Transfer Mode backbones.

The ATM Forum's Multiprotocol Over ATM (MPOA) subworking group is charged with developing a unified approach to transporting Layer 3 protocols over ATM. MPOA's goal is to take as much advantage of ATM as possible while offering the connectivity of a fully routed environment. MPOA will enable companies to build enterprise ATM networks and have the Layer 3 protocols take advantage of ATM quality-of-service (QoS) features end to end.

One way of understanding MPOA is as an evolution beyond the ATM Forum's LAN Emulation (LANE) specification, which maps legacy LANs to ATM.

MPOA, which operates at Layers 2 and 3, will use LANE for its Layer 2 forwarding.

LANE's scope is a single Layer 3 subnet, while MPOA allows direct ATM connectivity between logically different subnets. LANE also hides ATM from hosts. This means protocol stacks can operate without modification, but things like ATM QoS are hidden from the applications.

Integration with LANE is among a number of requirements the ATM Forum has identified for MPOA. The group also wants to separate switching from routing to enable development of low-cost edge devices that only switch. These devices would receive routing information from a server.

Building MPOA

The ATM Forum has set in place MPOA's architectural foundations. It is important to note, however, that this is a work in progress, so many of the details have not been finalized.

They key components of the MPOA architecture are edge devices, route servers and Internet Address Summarization Groups (IASG).

An edge device is a piece of hardware that can forward packets between legacy LAN and ATM interfaces. An example would be an ATM-attached hub serving a number of Ethernet interfaces.

A route server, which likely would be a router or a card embedded in an ATM switch, would use protocol routing tables to satisfy queries from other devices in the system. Usually a route server would also be capable of forwarding data packets on behalf of other devices while those devices are establishing direct virtual circuits.

The IASG is the primary unit of organization within MPOA. An IASG is a range of internetwork layer addresses summarized into an internetwork layer routing protocol. In a looser sense, an IASG refers to the set of hosts that have those addresses assigned.

For IP, this equates to an IP subnet. It is important to note that an IASG denotes both a Layer 3 protocol and address range. Upon initialization, if a host is running more than one protocol stack, it would join multiple IASGs.

Addressing hosts

The MPOA problem can be split in terms of the functions within an IASG and the functions between IASGs. These are considered small- and large-scale problems, respectively.

The intra-IASG problem relates to the registration and resolution of addresses for hosts within the IASG. Intra-IASG also deals with the interface into the bridged world beyond edge devices and encompasses a concept known as a distributed router. This means enabling multilayer switches — edge devices — to obtain Layer 3 routing information via external route servers.

A route server and the edge devices it serves constitute a distributed router. As mentioned above, the route server executes normal Layer 3 routing protocols. The challenge is to develop protocols that allow this routing information to be delivered to the edge device.

Since Layer 3 protocols direct packets to routers, an edge device can easily detect which packets are to be routed because they will contain a router's media access control (MAC) address. When the edge device detects the MAC address, it will parse further into the packet to find the Layer 3 address.

If a cache entry exists for this address, the edge device will move the packet onto the corresponding virtual circuit.

As new traffic flows are identified, the routing information necessary for those flows is delivered to the edge device to enable it to establish a direct circuit to the destination.

Establishing connections

The large-scale problem is essentially the same problem that the Internet Engineering Task Force's Routing Over Large Clouds (ROLC) group is addressing in its Next Hop Resolution Protocol (NHRP). The MPOA group intends to work with the ROLC group to generalize the functions of NHRP to meet the needs of MPOA.

In order to set up a direct ATM virtual circuit between two hosts or edge devices, two pieces of information are needed. One is the Layer 3 address of the optimal exit point from the ATM net.

In the case of an ATM-attached host, this is simply the host's Layer 3 address. For hosts that is not attached to the ATM network, this is the address of the edge device through which a data packet would normally exit the network.

The second piece of required information is the ATM address that corresponds to the Layer 3 address of the exit point. Routers are only able to resolve the Layer 2 addresses of the IASGs they serve directly.

A single query is used to obtain both pieces of information. The query is forwarded from route server to route server along the same path that a data packet would travel.

When the query arrives at a route server that either serves the IASG in which the destination is contained or whose route to the destination would forward off of the ATM network, this route server has the necessary information and answers the query.

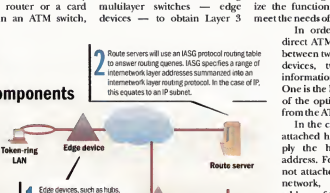
Once the query arrives back at the source, the destination ATM address can be used to establish a direct virtual circuit.

Swallow is chair of the ATM Forum's MPOA subworking group and principal engineer at Cisco Systems, Inc.'s ATM Business Unit in Billerica, Mass.

UP CLOSE

The MPOA components

The Multiprotocol Over ATM (MPOA) architecture is intended to support seamless transport of Layer 3 protocols across Asynchronous Transfer Mode networks. It comprises edge devices, route servers and Internet Address Summarization Groups (IASG).



NETWORK HELP DESK

Network World tracks down answers to your questions. Please submit them to Dona Thorat via phone at (800) 622-1108, via the Internet at djt@world.std.com or via fax at (508) 820-1103.

I am having trouble getting Mountain Network Solutions to honor its warranty for my Mountain External File Safe tape drive. The tape drive, which is only 9 months old, has repeatedly failed and should be replaced.

However, Mountain's customer service department representatives say they are unable to replace the faulty drive because they do not have this model in stock. I've been calling every week for two months and the drive is still not available. Can you help me get this company to honor its warranty?

Chris Dickson, Elk Grove Village, Ill.

You and a lot of other customers have the unfortunate luck of being caught in the middle of a buyout. Mountain Network Solutions' tape storage business was bought last week by NCE Computer Group for an undisclosed amount.

We contacted a senior-level marketing manager at NCE who told us Mountain Network Solutions was financially strapped and therefore unable to repair or replace any faulty equipment.

However, NCE says it plans to honor warranties on Mountain's data cartridge, digital audiotape and File Safe tape backup software, which will be sold by NCE's Mountain Network Solutions division.

For more information, call NCE at (800) 458-0300.

Be sure to visit Network World Fusion's Help Desk Forum where you can post your network-ing questions, provide solutions and exchange ideas with other users.

Network World Fusion

Point your Web browser at http://www.nwfusion.com, log in, select Forum and then Help Desk. We'll be monitoring the forum and occasionally publishing questions and answers posted to that site.

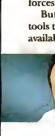
EDITORIAL INSIGHTS

Get this stuff — it works

One thing customers hate is vaporware — products promised but not delivered by vendors. But vendors aren't the only ones guilty of failing to back up their grand statements with deliverables. Many industry and user groups have been launched amidst a cloud of lofty rhetoric only to fade quietly into oblivion. (Right, Unix users?)

A notable exception is the Open User Recommended Solutions (OURS) group, where — since 1991 — customers and suppliers have been sitting across the table with each other to solve real problems. If you haven't heard much about OURS, that's because the group has focused on getting things done in its task forces rather than issuing press releases.

But OURS has amassed an impressive list of deliverables — tools that can make your life easier. Here's a sampling of what's available:



- The Network Management Task Force has delivered guides for buying directory and authentication services, as well as software distribution products. It's finalizing spreadsheet tools that will really simplify the buying process for those products as well as event and configuration management tools.
- The What Works With What Task Force has an insightful guide to buying electronic messaging products and is finishing a framework to aid in buying directory services.
- The Data Security Task Force has tools that can help you implement a single sign-on system and design an enterprise security administration plan. It's working to help you face the challenges of electronic commerce by hammering out guidelines for public network security.

This is a user group that works. It has identified critical issues facing customers, and it has gotten the major suppliers — Microsoft, IBM, Novell, Oracle, AT&T and others — to embrace the process. Customers involved with OURS talk about how much their employees have learned by doing the hard work of the task forces.

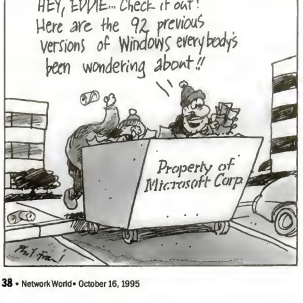
But OURS' deliverables are available to nonmembers, so you'd be wise to take advantage of OURS' groundbreaking work.

For more information, to get a taste of the tools or to buy them, call (312) 527-6782 or check the home page at www.ours.org.

John Gallant, editor in chief jgallant@nww.com

Teletoons

By Phil Frank and Joe Troise
guru@well.com



DISTRIBUTED COMPUTING

NDS should be the primary focus of Novell's new strategy

Time is running out for Novell, Inc. If the company's latest strategy (*NW*, Sept. 25, page 1) doesn't work, it's hard to see how Novell will survive as an independent company, despite its ambitious plans for NetWare (*NW*, Oct. 2, page 1). To succeed, Novell must make its NetWare Directory Services (NDS) a focal point for applications developers and users.

I have watched with dismay as Novell's position in the market has deteriorated during the last two years. So far, the company has been unsuccessful at repositioning itself. Novell's new strategy gives it a chance to survive as an independent company, but only a small chance.

The author of the new plan is Robert Frankenberg, who last year was appointed Novell's second-ever CEO. The strategy is a complete repudiation of Novell founder Raymond Noorda's attempt to compete with Microsoft on all fronts. Unlike Noorda, Frankenberg is trying to distance Novell from Microsoft, pointing out the significant differences between the two firms. Unfortunately, it won't be that easy.

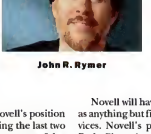
Novell's new strategy commits the company to selling network plumbing as its primary business. Novell will provide network services that are available from all relevant clients, to all relevant application server platforms and on all relevant network transports.

What are the network services upon which this strategy depends? One is connectivity, which is provided by Novell's protocol processing engines for IPX and TCP/IP. Another is NDS, which allows entities on a network to interact without prior knowledge of network addresses. Novell also manages security through NDS.

The strategy also depends on transaction and object management, services Novell is promising for the near future. Future services might include billing for the use of network services. Novell will provide services as well as cross-platform application program interfaces to those services.

The role Novell wants to play with its new strategy is similar to the one it played during the 1980s. At that time, Novell provided the software glue that connected PCs to LAN-attached file servers and printers. Novell complemented Microsoft and other suppliers of desktop environments. What's new in Frankenberg's strategy is Novell's commitment to support all kinds of application servers, including Hewlett-Packard Co.'s HP-UX, IBM's AIX, Microsoft's Windows NT and IBM mainframes, as well as all kinds of networks, including wireless.

Frankenberg is betting that in the next 10 years, the number of network-based applications will soar and that Novell will be able to supply essential services for those applications through alliances with its partners. Frankenberg is correct in his assessment of the opportunity. But his strategy risks making Novell a supplier of virtually invisible parts of somebody else's solution. There's no real customer focal point for Novell in the new strategy.



John R. Rymer

In announcing the plan, Frankenberg and his new technology czar, Sheldon Laube, sought to bury the term NOS and replace it with the term foundation services. That's too vague to make it a focal point for customers. NetWare is still there, but it is too closely associated with file sharing. (File sharing is a service that Microsoft has made a commodity.)

Novell will have a difficult time selling NetWare as anything but file, print and communications services. Novell's planned Green River, Moab, and Park City releases of NetWare are too broadly defined to change NetWare's time-honored identity. The best way for Novell to proceed is to pick one of its services and make it the focal point for the entire architecture.

NDS is the ideal candidate for this role in Novell's product line. NDS can be sold as a physical server to support transparent access to many resources. Now this is something understandable, a broadly applicable set of functions. Better still, Novell can emphasize NDS' security features. Security is a big concern for many, especially those who are corporate buyers of distributed computing technologies.

The best way for Novell to proceed is to pick one of its services and make it the focal point for the entire architecture.

Novell must make these two technologies the primary focus, and then sell its other foundation services as enhancements.

Without such a focal point, Novell will become invisible. Its software will be embedded in some portion of the distributed computing environments sold by AT&T, HP and The Santa Cruz Operation, Inc. These companies must promote their own names and added value — not Novell's — to succeed. It's easy to see Novell eventually being purchased by one of its current partners.

The only other focal point for Novell is its PerfectOffice and GroupWise applications. These applications are much more concrete than the important but vague foundation services at the heart of Novell's new strategy. This is undoubtedly why Frankenberg has held onto PerfectOffice and GroupWise in spite of disappointing results for the two product lines.

Frankenberg puts a good face on the sales and market share to date for PerfectOffice and GroupWise. But the fact remains that Microsoft is the dominant vendor in those markets and is likely to remain so. The two companies that have tried to challenge Microsoft in general office applications — WordPerfect Corp. and Lotus Development Corp. — were unable to remain independent.

Announcing the new strategy, Frankenberg quipped that it might be called "Back to the Future." Maybe. But if Novell can't make NDS a powerful focal point, there will be no future for Novell in its current form.

Rymer is editor-in-chief of "Distributed Computing Monitor," a monthly report published by Patricia Seybold Group, Inc. of Boston. He can be reached at jrymer @psgroup.com.

IN-BOX

Pointing out NetWare's flaws

I'd like to comment on your article "Novell's Enterprise NOS" (Sept. 11, page 63) with regard to directory services support in Novell, Inc.'s NetWare Version 4.1. The article says "NDS' naming scheme design is very similar to X.500 conventions.... There is no service to tie into any outside X.500 services, but this should not be a difficult step, assuming that the NDS database is set up correctly."

While it's true that the NetWare Directory Services structure was modeled after X.500, all similarities end there. Articles such as this one do more damage by misreflecting IS departments across the country than all of Novell's marketing literature.

By its mention of X.500, this article implies that NDS is X.500-compliant and, therefore, a road to Open Systems Interconnection connectivity. NDS is not X.500-compliant, and Novell has no intention of making it so.

NDS cannot pass any of the X.500 interoperability testing because NDS cannot participate as a peer in a distributed X.500 directory service.

Recent communication with Novell and announcements from the firm have indicated that not only does Novell have no intention of building peer services into NDS, but it also intends to supplant X.500 with NDS via ports to all other major NOS platforms.

In addition, if Novell had intended to merge NDS with X.500, it would not have reportedly commissioned E-Systems, Inc. with the task of developing an X.500 access module for Novell's GroupWise groupware application for the Department of Defense's new messaging system. Novell would simply have used the NDS hooks that GroupWise now has and built X.500 peer services into NDS.

I'd also like to comment on your article "Novell Solves Vision Puzzle" (Sept. 11, page 94). This story unintentionally points out the very core of Novell's problems.

Novell insists on the development and marketing of its own products, which continue to push and support Novell's proprietary protocols. This is an attempt to remold a world quickly losing interest in proprietary approaches. Consider:

■ Novell continues to push IPX as the protocol of choice for NetWare networks, even with the explosive growth of IP starting it in the face.

■ Novell is clearly attempting to supplant X.500 with NDS and X.400 with its own proprietary message service, all based on IPX.

■ NetWare servers still do not act as intelligent IP routers, although Novell continuously upgrades the IPX routing features.

This points out one of the core reasons for Novell's loss of market share and slumping stock price: the pervasive perception that IS departments that use NetWare are becoming islands.

The islands are isolated by Novell's insistence on pushing proprietary protocols and solving interconnectivity problems with poorly implemented gateways or by relying on third parties to develop interconnectivity add-ons.

Steven Jones
WAN coordinator
Texas Department of Mental Health and Mental Retardation
Austin, Texas

I-muxes not all the same

Your recent article on multirate ISDN (Sept. 25, page 30) points out several deficiencies in inverse multiplexers as a reason for moving to multirate ISDN. While I agree that there are reasons for moving to multirate, several of the characteristics of inverse muxes mentioned in the article were implementation-specific.

The time it takes to set up an inverse-multiplexed call has a common component and an implementation-specific component. The common component is the time it takes the network to set up the N channels plus the minimum time it takes to send synchronization messages between the inverse muxes.

The implementation-specific component is the time it takes to synchronize the channels.

The article states that it takes 30 seconds to set up a 384K bit/sec call and 1 minute for a 1.536M bit/sec call using an inverse mux. There is nothing inherent in inverse multiplexing that would cause this length of time.

Ten seconds should be the maximum acceptable time (and much lower for local calls) for a 384K bit/sec inverse-multiplexed call. While this is much more than 1 second for multirate, it is much less than the 30 seconds mentioned in the article.

The same goes for the 1.536M bit/sec call. (It should be less than 30 seconds for call set-up.) This is true for ISDN calls within North America. International calls will take longer.

Also, not all vendors automatically connect all channels immediately. There is nothing in the inverse-multiplexing standards that says equipment has to connect each call as it is received and thus start billing. That is an implementation decision by the vendor.

Hascall "Chip" Sharp
Senior systems engineer
Telesc Communications, Inc.
Eatontown, N.J.

Netscape flaw serious

Your recent article that mentioned the credit card encryption flaw in Netscape Communications Corp.'s Navigator 1.0 World-Wide Web browser (Sept. 25, page 136) contains some inaccuracies.

You quoted John Pescatore, an analyst with IDC Government, a Falls Church, Va.-based consultancy, as saying a hacker needs local access to your network in order to take advantage of the flaw in Navigator. But he is wrong.

By reverse-engineering a copy of Navigator, the UCLA graduate students mentioned in the story figured out that the mechanism Netscape uses to create a random number was easily replicated. Based on this, in a few seconds they were able to decrypt a random message encrypted by Navigator.

Their experiment showed two things. First, it showed that any message you send that is encrypted by that version of Navigator — the one that most everyone has — is not secure. It can be decrypted by anyone with decryption expertise who also has tapped your Internet data path. Since messages typically go through many hosts between source and destination, there are many points of vulnerability. That is the reason for encrypting messages in the first place.

Second, when networking software vendors build software that is going to be used for commerce, they need to have public and peer review of the algorithms used. If the Netscape engineers had posted their algorithm to the appropriate newsgroup on the Internet, they would have received immediate feedback.

Such feedback would have prevented this setback, which is serious mainly because it has shaken the public's trust in Internet commerce.

You cannot keep algorithms secret. Anyone with a code disassembler can figure them out.

The algorithms must stand on their own, creating encryption keys and using mechanisms that by their very nature are effective in guaranteeing their security.

Jon Campbell
Independent consultant
Campbell Quality Systems
Acton, Mass.

The author responds: Jon Campbell is correct in his assertions. Mike Homer, Netscape's vice president of marketing, said the random-number seed generator in the Netscape browser was not random enough, making it possible to decode a message in 1 minute on a LAN but requiring about 4 hours of computer time if intercepted on the Internet.

This is because more of the seed number's variables are easier to detect locally, simplifying the factoring time. Netscape has released a software patch to rectify the flaw.

Area code incorrect

A chart in the article "Those #$(&%*!%" area codes" (Sept. 18, page 24) shows the relief area code for Tampa, Fla. as 941. This is incorrect.

Tampa will remain in the 813 area code, while several central Florida counties, such as Polk county, will be changed to 941.

Richard Brackett
Senior systems engineer
Digital Systems Management, Inc.
Lakeland, Fla.

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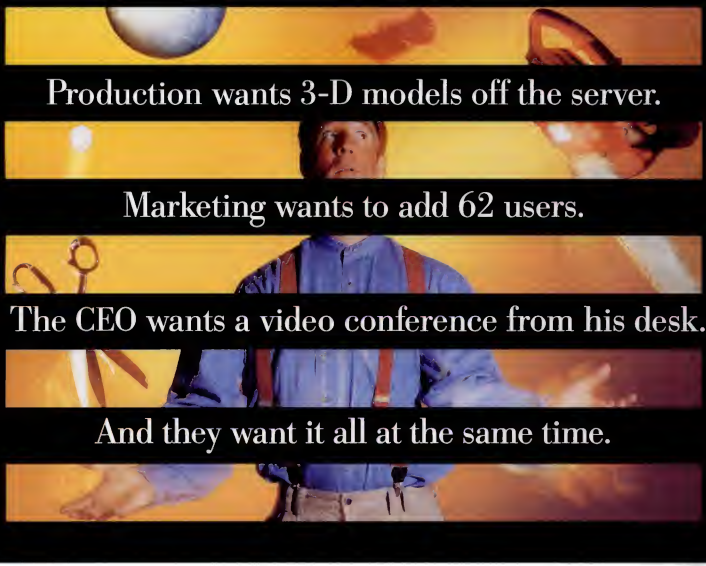

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Ready, set, GO REMOTE

In the race among six remote access servers, one unit takes the checkered flag.

By Gerald Williams and Jonathan Torta

Amid the rush to remote computing, some users are so glad to get access to the headquarters LAN that any solution seems better than none. In evaluating remote access servers, however, we found one that was better than at least a handful of others.

We examined Digi International, Inc.'s LANAserver 8e, Emulex Corp.'s ConnectPlus Pro, Telebit Corp.'s NetBlazer STi, 3Com Corp.'s AccessBuilder 2000, Xylogics, Inc.'s Remote Annex 4000 and Xyplex, Inc.'s MAXserver 1620. Each product supports IP and IPX for dial-in and dial-out access, has eight ports, and does not come bundled with modems.

We found that Remote Annex 4000 provided the best overall performance, posting fast file transfers in both directions. It also offered a strong combination of security and usability features, and was fairly easy to install.

The six products have many features in common, including their support for any Ethernet network. The units can all be rack-mounted, but while the other servers occupy one slot in a rack, the Remote Annex 4000 server requires two slots, and NetBlazer STi requires three. All ship with DOS and Windows client software and remote access server configuration tools. NetBlazer STi, ConnectPlus Pro, AccessBuilder 2000 and MAXserver 1620 also support Apple Computer, Inc. AppleTalk connections; LANAserver 8e and Remote Annex 4000 do not (see Figure 1).

Remote access server feature comparison

Figure 1

	LANAserver 8e	ConnectPlus Pro	NetBlazer STi	AccessBuilder 2000	Remote Annex 4000	MAXserver 1620
Protocol						
IPX/SPX	✔	✔	✔	✔	✔	✔
AppleTalk		✔	✔	✔		✔
TCP/IP	✔	✔	✔	✔	✔	✔
SLIP		✔	✔			✔
CSLIP		✔	✔	✔		
PPP	✔	✔	✔	✔		✔
PPP with PAP	✔	✔	✔	✔		
PPP with CHAP	✔	✔	✔			
Client applications						
Dialer	✔	✔		✔		
Port redirector		✔		✔		
Utilities						
Front-panel buttons	✔					
Windows utilities	✔	✔	✔	✔		
TCP/IP utilities	✔		✔	✔	✔	✔
Third-party security			SecurID, other third party	SecurID, ACE/Server, other third party		SecurID, Kerberos

Performance

In our tests, performance varied greatly. Most units used the full power of the modems to support compression and speed up transmissions. However, NetBlazer STi balked at running at 115.2K bit/sec; we had to run IPX tests for the Telebit server with the ports set at a speed of 57.6Kbit/sec.

The products also showed a slight difference in speeds based on the direction of the data flow because some move data more quickly from the server to the workstation than vice versa.

Our performance results represent the average between IP and IPX ratings. Overall, Xylogics' Remote Annex 4000 server provided the best performance.

With a single workstation transferring a compressible file to the server, Remote Annex 4000, LANAserver 8e and AccessBuilder 2000 all posted high scores — better than 62K bit/sec (see Figure 2, page 42). When the same files came from the server to the client, Remote Annex 4000, ConnectPlus Pro and AccessBuilder 2000 showed the best throughput, again mostly greater than 62K bit/sec. These products are optimized to buffer and compress transmissions to the workstation.

Transferring moderately compressible files shows the same split in performance (see Figure 3, page 44). Again, Remote Annex 4000 and ConnectPlus Pro performed well and were joined by MAXserver 1620, all with better than 36K bit/sec throughput. This remained true even when the direction changed and files were transferred from the workstations to the server.

Uncompressible files measure the true throughput of the systems (see Figure 4, page 44). Remote Annex 4000 excelled on these tests regardless of the direction the file traveled, demonstrating throughput of better than 23K bit/sec, and AccessBuilder 2000 was not far behind.

Interestingly, Telebit's product also placed well, even though we could not run the multiple user tests with data terminal equipment (DTE) speeds higher than 57.6K bit/sec. This shows that the product would likely be a good performer if it could take advantage of its modems' compression capabilities, as it can with Telebit's modems.

Throughput on each unit degraded at different rates as we added multiple users' traffic. ConnectPlus Pro, for instance, lost throughput when handling compressible files, and Remote Annex 4000 dropped in performance during tests with moderately compressible files. LANAserver 8e showed stress with eight users transferring noncompressible files.

Security

Once users log on to a remote access server, they must still enter a password to gain access to other resources on the network. In addition, the network administrator can establish filters to pre-

Continued on page 42

Continued from page 41

vent users from logging on to more than one server. The network administrator can also set limits on the length of a session and on total connect time over a given period.

A few companies, notably Telebit, 3Com and Xyplex, have extended security measures to include third-party devices. For example, all three companies' products support Security Dynamics Technologies, Inc. SecurID. With SecurID, end users get a smart card that displays an identification number that changes at a fixed interval, giving them unique passwords each time they log on.

MAXserver 1620 also supports Kerberos, an authentication technique that uses a master host with encrypted logons. AccessBuilder 2000 provides broad support for third-party security packages.

Routing tools

Security features solve one problem; routing features solve another. By supporting routing and filtering functions, a remote access server can act as a bridge between networks, allowing you to address multiple tasks with a single box.

AccessBuilder 2000, MAXserver 1620, Remote Annex 4000 and NetBlazer STi offer a broad range of filter options that allow you to configure remote access server routing functions. ConnectPlus Pro and LANAserver 8e offer only basic routing functions.

An earlier review (April 24, page 69) looked at several remote access servers that employ internal modems. We used the same testing techniques and modems, so results can be compared. To access this review on-line, point your Web browser at http://www.mvfusion.com. Select NetRef then Buyer's Guides and Reviews.

Network World Fusion

As this market matures, users can expect vendors to incorporate more routing and bridging functions into their remote access servers. For this reason, the ability to easily update the server software is an important feature.

Digi, 3Com and Xylogics employ flash memory that allows users to upgrade their firmware in their servers. MAXserver 1620 uses a PC Card flash card that can be replaced for an upgrade. Similarly, the NetBlazer STi boots from a diskette that can be updated.

Server configuration tools

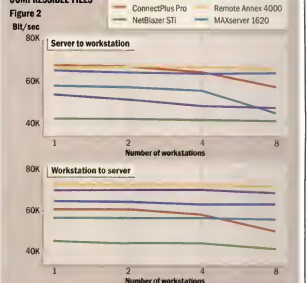
LANAserver 8e provides push buttons and an LED display on the front panel that you can use to access the configuration and set port speed and modem types. A Windows-based application running over IP can configure the unit, and Digi provides an IP stack and a WinSock Dynamic Link Library that helps if you are not already using IP. Once installed, the Windows interface automatically identifies the remote access server.

Of those tested, ConnectPlus Pro server installation package was among the easiest to use. The software runs on a workstation directly attached to either an IPX or IP network. It comes with installation wizards that identify all servers on the network and step you through the configuration process.

Once basic communications are established for the server, you can use pull-down menus to access more detailed configuration options. The program also offers a modem wizard that attempts to automatically configure the modems attached to the server ports. We needed to go into the configuration program to better define specific items, but the wizard routine simplified initial installation.

Telebit's NetBlazer STi is configured through a directly attached console or through an IP-attached network workstation. Both access methods open a command-line manager that lets administrators configure each port individually or set all the ports to the same

Continued on page 44



Note: NetBlazer STi was not able to operate at DTE speeds higher than 57.6K bit/sec with the non-Telebit modems in our IPX test.

NetResults

Product	Vendor	Price	Pros	Cons
LANAserver 8e	Digi International, Inc. 6400 Flying Cloud Drive Eden Prairie, Minn. 55344 Phone: (800) 344-4273; (612) 943-9020 Fax: (612) 943-5398 E-mail: sales@digibd.com URL: http://www.digibd.com	$3,495	▲ Front panel allows managers to configure the system manually. ▲ Windows-based setup utility.	▼ Uses 9-pin ports that are placed too close together to employ hooded connecters.
ConnectPlus Pro	Emulex Corp. 14711 N.E. 29th Place Bellevue, Wash. 98007 Phone: (800) 590-5773; (206) 881-4063 Fax: (714) 513-8266 E-mail: diane@emulex.com URL: http://www.emulex.com	$2,895	▲ Self-configuration tools simplify installation. ▲ Above-average performance.	▼ Requires PCMCIA modems, which cost more than other modems. ▼ Only supports limited brands of PCMCIA modems.
NetBlazer STi	Telebit Corp. 1 Executive Drive Chelmsford, Mass. 01824 Phone: (800) 835-3248; (408) 734-4333 Fax: (408) 734-3333 Email: info@telebit.com URL: http://www.telebit.com	$3,199	▲ Quick file transfers for IP traffic. ▲ Command-line interface features menu approaches to simplify changes to line settings.	▼ Cannot support DTE speeds above 57.6K bit/sec on IPX links. ▼ Limited modem support provided with package; users required to download setup strings for third-party modems. ▼ Physically oversized enclosure requires 3 rack spaces.
AccessBuilder 2000	3Com Corp. P.O. Box 58145 5400 Bayfront Plaza Santa Clara, Calif. 95052-8145 Phone: (800) 638-3266; (408) 764-5000 Fax: (408) 764-6740 URL: http://www.3com.com	$3,895	▲ Easy installation. ▲ Good overall throughput.	▼ Ethernet port configured in front exposes cable in rack configurations.
Remote Annex 4000	Xylogics, Inc. 53 Third Ave. Burlington, Mass. 01803 Phone: (617) 272-8140 Fax: (617) 273-5392 E-mail: sales@xylogics.com URL: http://www.xylogics.com	$4,795	▲ Best performance under most conditions. ▲ Easy-to-use Windows-like configuration tools.	▼ High price. ▼ Uses custom octopus cables.
MAXserver 1620	Xyplex, Inc. 295 Foster St. Littleton, Mass. 01460 Phone: (800) 338-5316, (508) 952-4700 Fax: (508) 952-4702 Email: info@xyplex.com URL: http://www.xyplex.com	$3,595	▲ Self-configuration tools simplify setup.	▼ Confusing nonstandard use of backspace on console command line. ▼ If modems do not automatically configure, users must adjust them through command-line interface.

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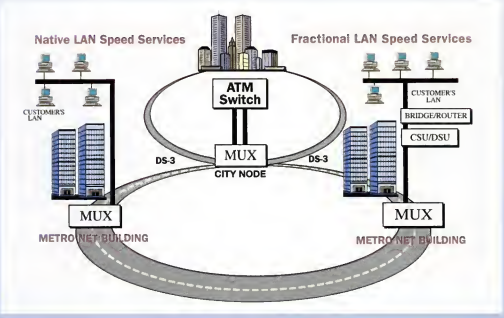

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Continued from page 42

parameters.

Although this is not a difficult interface, we preferred the menu-driven program, which is also available from either the console or a workstation. This tem among the easiest to configure and use.

Xylogics' Remote Annex 4000 can be configured with a utility running on a workstation attached to the network via IP, but Xylogics does not include an IP stack. The configuration utility provides a Windows interface with several tools to simplify the installation process.

We also experimented with the console interface. This is similar to other utilities, implementing a command language that is used to configure the ports. Most console interface functions are easy to understand, and the program provides enough help to guide experienced administrators to the information they need.

The interface includes a cursor-key recall of previous commands, allowing you to change a setting, test it, then save the setting without rekeying the entire command string each time. We encountered a minor annoyance, however: Typing the backspace key at the console moves the cursor to the front of the command line rather than back one space.

We found that same problem with the MAXserver 1620 configuration utility, although some of its other features helped to compensate for that. For example, the utility uses IP to automatically find devices on the network and configure itself. You install remote access server software from a PC attached to the server acting as a console. After it is initialized, MAXserver 1620 deciphers IP and IPX addresses.

You can also access a command-line configuration utility that uses such easy-to-remember commands as SHOW, SET and RESET. The unit buffers commands so that administrators can repeat actions easily for each port. The utility also permits you to set more than one port at a time, or a port's configuration can be copied to the other ports with a single command.

During installation, we encountered some problems getting our U.S. Robotics, Inc. Total Control modems to work with MAXserver 1620. Rather than support specific modems, MAXserver 1620 documentation provides sample settings for several classes of modems. We were able to establish connections with DTE speeds set to 38K bit/sec, but we found that connections with the DTE speeds set at 115.4K bit/sec were less predictable. After much experimentation, we finally connected at the higher DTE speeds.

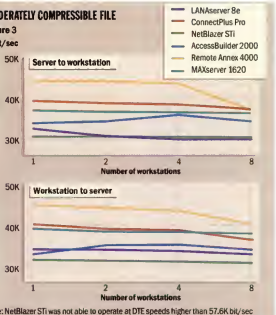
An interesting server tool is MAXserver 1620's memory control utility, which allows administrators to assign more or less of the memory provided in the server to each port. Using this utility, managers can disable Simple Network Management Protocol or logging functions to ease occasional bottlenecks.

All the products described here offer both DOS and Windows clients for remote users.

See Review, page 50

MODERATELY COMPRESSIBLE FILE

Figure 3



Note: NetBlazer STi was not able to operate at DTE speeds higher than 57.6K bit/sec with the non-Telebit modems in our IPX test.

allowed us to set up users and configure the server more quickly and easily.

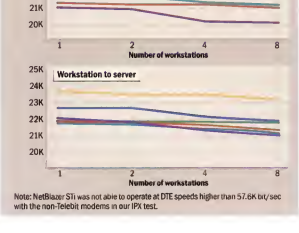
NetBlazer STi is sensitive to modem types. Drivers for Telebit modems and a few of the most popular modems are included with the package. If you have modems not supported by the drivers included with the package, you'll need to go to the Telebit bulletin board system and download the proper setup strings. Be sure to obtain modems supported by Telebit before installing the unit in order to eliminate most installation problems.

The configuration utility provided with 3Com's AccessBuilder 2000 relies on IP addressing to create a link between a network workstation and the remote access server. However, 3Com does not provide an IP stack, so if you use IPX exclusively, you must obtain a stack elsewhere before trying to use the program.

The setup utilities are straightforward and easy to use. You configure AccessBuilder 2000 from a workstation on the network or directly from a console attached to the server. The Windows-based program provides a friendly interface. The unit supports a wide array of modems, and its default settings are generally the parameters users select. We ranked this sys-

NONCOMPRESSIBLE FILE

Figure 4



Note: NetBlazer STi was not able to operate at DTE speeds higher than 57.6K bit/sec with the non-Telebit modems in our IPX test.

HOW WE DID IT

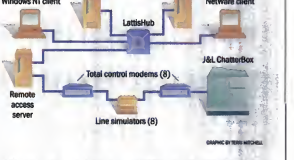
Our remote access server test configuration had a network side and a remote side. Our network hosted Novell NetWare 4.1 and Microsoft Windows NT servers running on separate Digital Pentium-based DECpc XL Server 566s with 16M bytes of RAM and 1G byte of SCSI disk storage, connected to an Ethernet LAN via Microdyne NE2000 adapters.

We also connected our remote access servers to the LAN as well as two workstations to configure them. The workstations were Digital Prioris PCs with 100-MHz DX4 processors and 8M bytes of memory. Our NetWare client ran Windows 3.1, while our NT client ran Windows NT Workstation.

All the network devices were connected through a Bay Networks LattisHub 28135A 10Base-T hub (see graphic).

We installed each remote access server using its default settings, except for port speed, which we set to 115.2K bit/sec. The ports connected to U.S. Robotics' Total Control V.34 rack-mountable modems.

REMOTE ACCESS SERVER TEST CONFIGURATION



On the remote side, our clients ran on a J&L Information Systems' ChatterBox with eight independent 66-MHz 486 processors. Each board supported its own 210M-byte disk drive and RS-232 interface with a 16550 Universal Asynchronous Receiver-Transmitter.

We installed the client software that came with each remote access system on all of the eight ChatterBox systems and connected them to the modems. We simulated telephone lines using Northeast Innovations' S-2 Central Office simulators. These devices imitate a clear telephone channel and provide the dial tone and ringing needed to connect the modems.

For each product, we established a link between the remote system and the remote access server, and logged on to the NetWare server for IPX connections and the Windows NT server for IP links. We then copied test files to and from the network. We repeated our tests with one, two, four and eight remote workstations using both protocols.

Our transfer tests used three 300K-byte test files — one very compressible file, a somewhat compressible file and a file that was difficult to compress — to determine how effectively the remote access servers and modems compress data during transfers.

In addition to performance, we looked at each product's configuration tools, bundled client software, and security and routing features.

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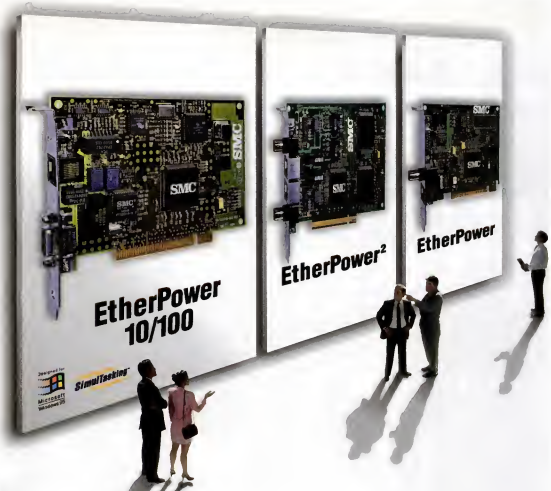

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Continued from page 1

Seldes says. "There are tremendous personality conflicts to any merger, especially if you are on the side of the fence that isn't going to win. I just didn't want to live through it again."

Almost anywhere you turn today, mergers and acquisitions are reshaping the corporate landscape (see graphic).

These attempts to create market powerhouses place an enormous burden on network and IT management to maintain high-quality services, while simultaneously uniting businesses with different workflow processes under a common network architecture. The strains for network executives go well beyond employee uneasiness, stirring a cauldron of steamy issues that span networking technology, corporate politicking, IT staff morale and other concerns.

Observers say there are steps you can take to better prepare for a merger scenario. Tops on the list are standardizing on limited sets of technologies while clearly defining staff roles and expectations. Some even suggest reorganizing IT as a stand-alone business unit prepared to compete for the business of its in-house customers.

Planning can only take you so far, however.

"The main concerns stem from different corporate philosophies and conflicting cultures," says Jerry Cooperman, vice president and research director of the Network Technology Strategies consulting unit at Stamford, Conn.-based Gartner Group, Inc. "You've got to get a handle on those issues before you can ever tackle the technology."

At Chemical Bank, Seldes says, IT and net projects are in limbo as various units ponder their strategic directions in the face of the Chase merger.

"It leaves a nice air of confusion about who's going to be around to see these things through," he says.

Frank Carnella, senior vice president of technology planning for Chemical, agrees that many projects may stall. "Some things will no longer be relevant or need to be put on hold and later reinvigorated into the larger picture," he says. Even Chemical's own massive standards efforts need to be rethought because "they are no longer standards for Chemical but for the new Chase," Carnella says.

One move Chase made clear shortly after the companies revealed their merger plan on Aug. 28 was the appointment of 39-year-old Dennis O'Leary as chief information officer.

O'Leary is not only one of the industry's youngest CIOs, but also an outsider of sorts, having risen through the ranks from commercial loan officer without ever holding an information systems position.

O'Leary's appointment, and other imminent personnel changes like it, are a major step in relieving much of the anxiety network staffers may feel during a merger or acquisition, Carnella says.

"You need to get [IT] management in place early so they can map out their plans and identify roles for their staff," Carnella says.

There's another reason to identify the networking and IT management team early on says Bruce Woodlan, director of PEPL Computer Systems for Panhandle Eastern Pipeline Co. in Houston and a veteran of several mergers.

"There can sometimes be confusion about who is in charge," Woodlan says. "In our case, the issue came down to who was the bigger gorilla between the two of us and which of our technologies was going to take us forward."

PEPL, which merged with the larger Texas Eastern Pipeline Co., opted to combine both IT departments into a central service bureau that catered to three separate business units.

The decision backfired. "We had a tough time in IS trying to figure out who we were working for," Woodlan says.

Ultimately, the company decided to allow each business unit to operate its own network and IT staff. Now Woodlan and his team report only to PEPL executives and have a much clearer IT vision and line of responsibilities. The move also gave them the opportunity to migrate to a client/server-based net architecture that Woodlan says puts the company "several years ahead of other pipeline companies."

That's not always the case, however, as some mergers dictate the need for IT organizations to move more slowly than the parties would like, Chemical's Carnella says.

"We have to go about this [merger] very cautiously," he says. "There cannot be liberal data sharing until the merger is approved and passes regulatory hurdles," which may not be until next April. Until then, the two companies will continue to operate as separate businesses with separate IT staffs.

Even with the probable consolidation of data centers and network infrastructures, Carnella says he does not foresee significant IT layoffs in the near term.

"Our merger is predicted to generate savings of $1.5 billion annually for the first three years," Carnella says. "There will no doubt be some downsizing, but the technology areas will likely lag other sectors."

Despite assurances like that, Seldes says some employees will remain pessimistic. "As a manager, you're supposed to take the party line and say that not any one person's job is in jeopardy," he says. "But hardly anyone has faith in that because no one really knows for sure.

The A-team approach

When it acquired nearly 60 Channel Home Centers, Inc. stores last November, Rickel Home Centers, Inc. adopted a team philosophy toward dealing with net staffers, according to

Continued on page 48

Chemical's Carnella *recommends getting IT management in place early to map out strategy.*

The big get bigger

Partial list of recent mergers and acquisitions

Suitor	Target	Deal valuation
Chase Manhattan	Chemical Bank	$10 billion
Disney	Capital Cities/ABC	$19 billion
Upjohn	Pharmacies of Sweden	$6 billion
Kimberly-Clark	Scott Paper	$7 billion
Union Pacific Railroad	Southern Pacific Railroad	$5.4 billion
Time Warner	Turner Broadcasting	$8 billion

Hospital deals with the flip side: when vendors merge

Mergers and acquisitions are at least as common among network technology companies as in any other vertical market, raising the issue of what customers do when one of their primary vendors gets swallowed up.

Wayne Arnold, technical support manager at Baptist Hospital in Memphis, Tenn., has been holding his breath since late July. That's when he learned Chipcom Corp. — his primary hub supplier — had been acquired by rival 3Com Corp.

"We've relied on the Chipcom gear for the last three years," Arnold says. "We didn't want to see the products discontinued or be stuck with no means of getting replacement parts."

The hospital opted for Chipcom over other hub products due to a competitive price per port and a flexible design that accommodated Ethernet and token-ring modules, as well as bridging and routing.

"We've been using them for three years and believe we can still get three more years out of the boxes," Arnold says.

So when 3Com announced its purchase of the company, Arnold immediately put out feelers to his local Chipcom representative as well as some 3Com resellers in hopes of learning the fate of the ONline hubs.

But 3Com got the word to customers first, Arnold says, assuring customers it shared some basic market philosophies with Chipcom and did not intend to discontinue the Chipcom gear.

Moreover, Arnold says, 3Com guaranteed support of the product for an additional five years. "If I'm going to get five years of support on a product I just bought, I'm a happy camper," he says.

With those assurances in hand, Arnold says Baptist Hospital felt comfortable making some short-term purchases to satisfy immediate needs for remote offices. However, Arnold says he has reserved decisions on switching products until the combined 3Com/Chipcom begins to show its cards in that area.

Arnold says the two vendors also need to address how they intend to unload network management of the combined product lines. "I certainly don't intend to buy two packages to manage products," he says.

Baptist Hospital is no stranger to vendor mergers; it lived through the union of SynOptics Communications, Inc. and Wellfleet Communications, Inc. that formed Bay Networks, Inc.

"The key is to communicate with the companies quickly and understand their intentions," Arnold says. If the two parties won't give straight answers about product decisions, then you may have to devise plans for obtaining spare parts and service without help from the original vendor.

Moreover, you can always freeze product orders, a tactic that Arnold says grabs vendors' attention immediately.

"What it comes down to is needing to know the new company stands behind the products you've invested in," Arnold says. "But even with the info we have now, only the future will tell how well it all pans out."

IT MERGER MANIA

Merger and acquisition transactions in the IT industry jumped 76% in the first six months of this year as compared to the same period in '93 and '94.

SOURCE: BROADVIEW ASSOCIATES, FORT LEE, N.J.

BUDGET TO DIE FOR

The proposed merger between Chase Manhattan Bank and Chemical Bank would marry IS departments with a combined budget of $1.7 billion.

Continued from page 47

Bruce Conforto, vice president of IS at Rickel in South Plainfield, N.J.

Rickel decided to keep about a third of the 30-person IT staff it inherited from Channel. But rather than hand out pink slips when the merger went public, Conforto created an "A" team of long-term employees the company intended to keep and a "B" team of transitional associates. A combination of retention bonuses and healthy severance packages kept the transitional personnel onboard.

"The key is good communication early on," Conforto says. "We wanted to give the transitional team time to find new employment while also fulfilling a short-term technology need."

Personnel issues aside, IT management eventually must turn its attention to integrating the physical network infrastructures and consolidating data centers and backbones.

"Some pieces of the pie have to come together before other pieces," says Chemical's Carnella. Critical areas such as trading systems, foreign currency and exchange systems gain higher priority from the Chemical/Chase merger teams, while other systems may be temporarily farmed out to service bureaus.

Rickel's Conforto says that when companies merge or acquire a business unit, they have two options. The controlling organization may decide simply to import key data from one organization to the other and maintain use of existing applications and network services at one of the two companies.

The second, more common approach, Conforto says, is a best-of-breed strategy. Here, companies take the best network services, applications and systems from each company and attempt to blend them into a new infrastructure.

"Because Rickel was strong in different areas than Channel, it made sense to use the best of each organization's systems," Conforto says.

In a merger or acquisition situation, "The main concerns stem from different corporate philosophies and conflicting cultures," says Gartner Group's Jerry Cooperman.

Rickel, for instance, retained its distribution and logistics systems but imported Channel's financial systems. Luckily for Rickel, both companies wrote COBOL and VSAM applications for IBM mainframes. "Our application developers had a lot in common," Conforto says.

The best-of-breed approach can get sticky, he cautions. "The decision gets complex and that runs counter to the goal of any merger, which is to move quickly," Conforto says. "It requires a good deal of analysis design and work building the right interfaces."

Chemical's Carnella says the new Chase is putting a slightly different spin on best-of-breed decisions. "We're looking at it from a suite level, as opposed to taking component elements from some applications to patch together the best-of-class application," he says. So Chemical may choose a suite of financial applications and a suite of network services, rather than pick several disparate net services and different applications and force-fit them.

The Chemical/Chase team also will need to keep growth in mind, Carnella adds. "The ability to sustain the new volumes this company will achieve has not been designed into the systems used by either companies," he says. So the bank management will pay close attention to which systems can be made to scale well and which are the most flexible to meet changing business parameters.

Another factor that goes hand-in-hand with fusing network infrastructures is outsourcing some tasks or operations that are not deemed critical to the short-term success of the merger. Almost every network or IS manager who has been through a merger or acquisition points to outsourcing as a valuable tool to lessen the pressures weighing on IT staff.

Continued on page 50

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Feature

Continued from page 48

Gartner Group's Cooperman recalls that Chase Manhattan jobbed out a good deal of its network support about a year and a half ago, reducing the issues management has to deal with now. "But that also means that the new team coming in will inherit those outsourcing contracts and the issues that ride along with them," he adds.

Ready to merge?

Some companies may adapt better to large-scale mergers or other business deals due to their prior track record, such as Chemical Bank's experience from the Manufacturer's Hanover merger. But several net executives believe there are definite steps you can take to be better prepared for merger mania.

"Put standards at the top of the list," suggests PEPL's Bruce Woodlan. Panhandle Eastern Pipeline is in an ideal position today due to the numerous LAN standards and common API sets the company has adopted.

BANKING ON BIGNESS

With a staff of 12 IT professionals, AmSouth Bank has managed 18 mergers and acquisitions over the past 24 months in its quest to become a regional banking conglomerate.

"Standards let you swap out the components," Woodlan says. "We view IT as a big puzzle, and standards are the only thing that allow us to fashion our strategy — pulling out some parts and replacing them with others."

Cooperman says networks shops and IT departments need to run themselves as stand-alone businesses and profit centers that enter into service-level agreements with in-house customers, institute charge-back mechanisms and manage their assets wisely. "Few IT shops have that kind of discipline as part of their organizations," Cooperman says. "But if there's a way to prepare for a possible merger, that type of organization will likely be the survivor."

Several large firms have given their IT organizations two to three years to transform themselves into competitive businesses.

At the end of that time frame, they intend to issue requests for proposal to outsource their network operations and will invite the internal IT shop to bid against others. If the IT shop wins, they get the business.

But even the best laid plans may not be enough for everyone, warns Seldes, the former Chemical Bank employee.

"Major decisions are made on-the-fly, and all the while management says how smoothly things are going," he says. "In the trenches, where things have to get done, the result is like warfare. And it takes a toll." ■

Learn more about mergers and acquisitions on NetworkWorld Fusion

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Robert Wescott
Distribution Manager

Review

Continued from page 44

LANserver 8e, ConnectPlus Pro and Remote Annex 4000 client software provide good feedback to dial-in users in the form of simulated modem lights, and they display commands as they are sent to the modem, along with the modem's response.

ConnectPlus Pro, Remote Annex 4000 and MAXserver 1620 client software packages attempt to configure modems automatically. NetBlazer STi can automatically configure any modem listed in a modem initialization file on the server's boot diskette. The other programs require users to select the modem they need to support.

All the products' clients operate well and offer an easy-to-learn, straightforward interface. AccessBuilder 2000's interface, in particular, provides good feedback on the status of the connection and allows administrators to easily configure modems and phone numbers.

Documentation

Documentation is another story. The Digi LANAserver 8e's detailed loose-leaf manual ships with the Digi product, but it doesn't match the high quality exhibited by the other products' manuals. LANAserver 8e's manual includes several addenda that detail how best to configure the remote access server for such environments as Windows for Workgroups, IP networks and Novell, Inc. NetWare.

ConnectPlus Pro's manual from Emulex is clearly written and easy to follow. It covers necessary information without getting bogged down in technical issues.

Telebit's NetBlazer STi manuals are long but well organized and helpful. They offer several examples for setting up optimal links, and they serve as a good learning tool. They also show how to operate effectively with many different platforms.

3Com's AccessBuilder 2000 includes good documentation for both the client and the network manager. Installation guides walk you through configuration step-by-step. There are also handy checklists that give users all the data they need to successfully install and run the client software with a minimum of support.

Xylogics' Remote Annex 4000 comes with the most substantial documentation, comprising several softcover manuals. Most are reference books that need not be used to configure the remote access server and install user software. Rather, they cover a broad range of networks and provide information to fine-tune performance in many environments.

Xyplex's MAXserver 1620 ships with a single Installation manual that provides the information needed to get started. All other documentation comes on a single CD-ROM. We find that this electronic documentation saves users time.

We rated the ConnectPlus Pro, AccessBuilder 2000 and Remote Annex 4000 as the easiest to configure, with LANAserver 8e close behind. While MAXserver 1620, in theory, configures itself, we found that we had to adjust the setup to use our U.S. Robotics Total Control modems. NetBlazer STi also was easy to set up, but its focus on supporting Telebit modems makes it more difficult to configure using other manufacturers' modems.

We rated the client packages roughly even. Remote Annex 4000 and AccessBuilder 2000 delivered strong performance in most situations. If most data traffic, as is typical, flows from the server to the workstation, ConnectPlus Pro is another good choice. ■

The alliance is a cooperative of users, consultants, educators and integrators that applies its technical and business skills to analyze and compare strategic network products. A list of alliance partners can be found on page 39.

Williams and Torta are consultants with TeleChoice, Inc. They can be reached via E-mail at gerry_williams@telechoice.com and jonathan_torta@telechoice.com.

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Briefs

■ **Digital Equipment Corp.** *said it is moving its* **Multivendor Network Services** *organization to a new center under construction in Pittsford, N.Y.*

The company also said the 60-member group will offer its network consulting, integration and management services across a wider geographic area, expanding from a regional operation to one serving the entire U.S., Canada and Latin America.

Digital: (716) 359-4029.

■ **Horizons Technology, Inc. (HTI)** *unveiled a* **Software Subscription Program** *that will help users of its LANauditor net inventory product save money on upgrades, maintenance releases and technical support.*

The program includes **Premium, Standard and Software Dictionary** *support plans. The Premium option offers users toll-free technical support and free product updates. The Standard plan differs only in that major product upgrades are discounted 50%. The Software Dictionary entitles users to receive a quarterly software dictionary update on disk or through HTI's World-Wide Web site.*

Each option's fee is based on the number of nodes LANauditor tracks. The Premium option is priced at $1 per node, the Standard option costs 75 cents per node and the Software Dictionary is 50 cents per node.

HTI: (800) 828-3808.

■ **Carlini & Associates, Inc.** *will conduct a* **"Requests for Proposal (RFP) and Contracts for Information Technology Projects"** *seminar on Nov. 8 at La Perla restaurant in Hillside, Ill.*

James Carlini and attorney Russell Hartigan will speak at the seminar, which is intended to give users hints on how to prepare RFPs, evaluate responses and review purchase contracts. The seminar costs $295.

Carlini & Associates: (708) 986-1888.

Network security without keys

Start-up promises E-mail privacy without the accompanying management headaches.

By Winn Schwartau

Network and security administrators may soon get what they need to blast past the one thing that has kept them from using encryption across the enterprise: the nightmarish task of key management.

Elementrix, Ltd., a subsidiary of the $1.5-billion Israeli technology giant Elron Electronic Industries, Ltd., has been briefing analysts about a technology that eliminates the need to assign and manage the keys required to encrypt and decrypt electronic mail messages and Internet ftp sessions. The company also presented the technology at the recent Networld+Interop 95 show.

The technology is embedded in one of Elementrix's first products, software called Power One-Time Pad (POTP) that poses a threat to the market dominance of cryptography products that are based on the Rivest, Shamir and Adleman (RSA) algorithm. The patents on RSA technology begin expiring in 1997.

The technology behind POTP is a radical departure from existing linear encryption algorithms. Such algorithms scramble data in an effort to thwart eavesdroppers, ensure that data has not been modified during storage or transmission and to prove its place of origin.

Traditional thinking is that no matter what kind of encryption is employed, you have to use keys to encrypt and decrypt the data. With the Data Encryption Standard (DES), the sender and receiver need the same encryption keys. These keys have to be administered properly or, like passwords, their value disappears. This requires a labor-intensive infrastructure to deal with the various technical and policy issues involved.

RSA's public- and private-key management scheme improves the situation but still requires you to build a security infrastructure for distributing, managing and protecting keys.

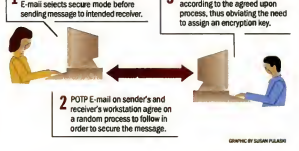
With POTP, keys are not required because the product doesn't use an encryption algorithm; instead it synchronizes random processes on two computers as they communicate. The random properties of the two parties become the unbreakable "secret" they share. In essence, each sequence of bits within each transmission is encrypted with a different key, but the user doesn't have to know about the keys — it's entirely transparent (see graphic).

No keys required

1 User at workstation running POTP E-mail selects secure mode before sending message to intended receiver.

2 POTP E-mail on sender's and receiver's workstation agree on a random process to follow in order to secure the message.

3 The message is sent securely according to the agreed upon process, thus obviating the need to assign an encryption key.



GRAPHIC: BY SUSAN FULADI

"The concept is incredible — continuously changing keys that no one, not even the user, knows," said Al Decker, a partner of Coopers & Lybrand, LLP in New York. "There's nothing breakable from a conventional cryptographic standpoint."

With DES, RSA and other algorithm-based cryptography schemes, keys are fixed. This means that the same ones are used for every session and must be centrally managed in large networks or on the Internet. As technology improves, longer and longer fixed keys will be required to prevent the codes from being cracked.

"POTP is brilliant, and it's scary," said Todd Sunn, director of business development for Mergent International, a Rocky Hill, Conn., security product maker. "You just don't have to manage keys. It's like having the strength of the Diffy-Hellman approach but without the drawbacks." The Diffy-Hellman approach offers public-key encryption.

"Administration is always the struggle," said Bruce Bonsall, manager of information security at Massachusetts Mutual Life Insurance Co., which has used early versions of POTP.

"POTP eliminates the need to manage keys, and that's a big plus, especially since it's likely we'll have to encrypt everything within a couple of years," Bonsall said. "POTP will simplify the security process. My gut reaction is that it will do very, very well. From our tests, it appears to be very secure."

To understand how POTP works requires a shift in thinking. But once the philosophy of continuous randomness becomes clear, conventional CPU-intensive, time-wasting encryption seems almost silly.

The Internet has migrated to Pretty Good Privacy (PGP) as its cryptography scheme of choice, in large part because it's free. But POTP eliminates the need for a secret exchange of information between two parties before they can communicate securely, and there is no need for central servers where PGP keys or RSA public keys need to be kept.

If key management has been driving you batty, then wait until you see POTP.

Schwartau is president of Inter.Pact, Inc., a consulting firm specializing in information security and electronic privacy. He is author of Information Warfare: Chaos on the Electronic Superhighway *and* Terminal Compromise, *and is editor of "Security Insider Report," a monthly newsletter. He can be reached at (813) 393-6600 or via the Internet at winn@infowar.com.*

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The Comdex/Fall '95 show running Nov. 13-17 in Las Vegas has plenty to offer network managers. A special Communications Showcase will include an EnterpriseLive exhibit in which users get to play with the latest gear in a demonstration net. The showcase will also include an ISDN pavilion sponsored by the Corporation for Open Systems International.

CONFERENCE *planning*

A series of conference sessions in the wireless and mobile, distributed computing and net infrastructure tracks will cover many topics. A series of Comdex InFocus sessions will home in on the strategies of leading vendors, allow users to glean management strategies from case studies and get a feel for networking hot spots in the coming year.

And that's not to mention the bigwig keynoters: Lou Gerstner, IBM chairman and chief executive officer; Bill Gates, Microsoft Corp. chairman and CEO; and Robert Frankenberg, Novell, Inc. chairman and CEO.

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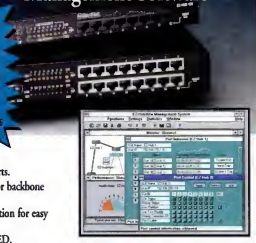

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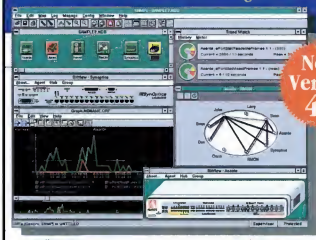

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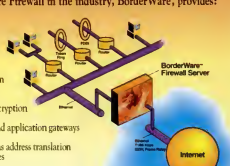

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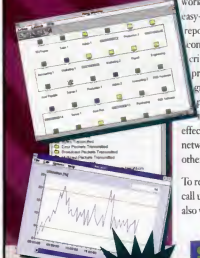

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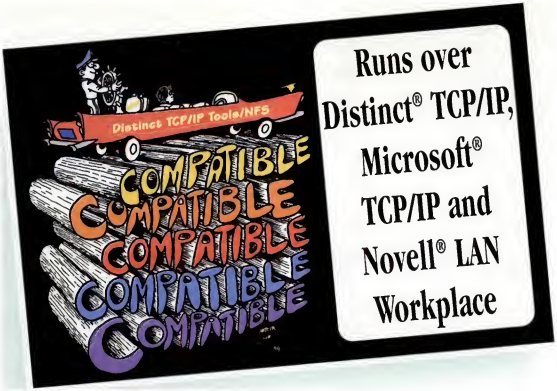

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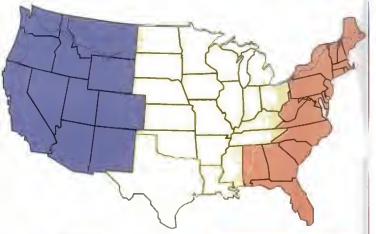

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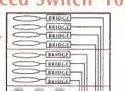

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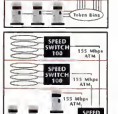

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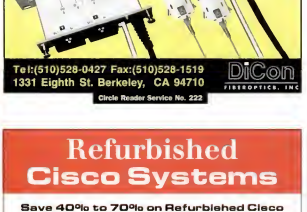

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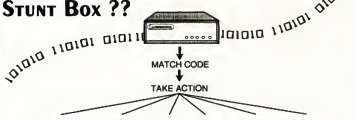

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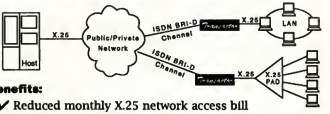

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Manzi

Continued from page 1

Manzi's reason was simple: "I don't think I am exactly the right person to lead a division of a $70-billion-plus organization."

Manzi had some disagreements with IBM over where Lotus should go and how IBM's software business should be managed. His leaving clearly puts the Lotus ball in the IBM court. "It's like we are losing Lotus," one employee said, citing other recent high-level defections.

One person Lotus will not lose is Notes creator Ray Ozzie, who pledged to stay on "as a tribute to Jim."

Many wondered how long Manzi would last at IBM. In a teleconference that took place not long after IBM announced its hostile takeover attempt, Manzi bristled at IBM Chairman Louis Gerstner's insistence that the companies had already been negotiating a merger. Manzi said he had not been working on any such deal.

No shortage of stories

The Manzi legacy is filled with unusual events, including:

■ At the gala Boston Computer Society launch of Microsoft Word 5.0 for DOS, Bill Gates was asked if he had any advice for Manzi. Gates told the audience Manzi should "learn to program in C." Manzi later said, "I have no particular need to have a male-bonding experience with Bill Gates" and described Microsoft's Windows strategy as "software jihad."

■ Philippe Kahn once put a copy of the now-defunct *New England Monthly* magazine, which trashed Manzi on its cover, under the doors of every attendee at Esther Dyson's PC Forum. Kahn, when found out, apologized.

■ Manzi thought he had bought Novell, Inc., then went to Disney World where he got the bad news.

■ Preparing for an interview with CBS in New York, Manzi was told by then-PR-head Greg Jarboe that a blue shirt looks better on TV. Manzi only wore white, so the two rushed off to buy a new shirt. The interview, it turns out, was with CBS radio.

Manzi liked the shirt anyway, and afterward was rarely seen in anything but blue.

Manzi's career has also been one of notable successes and failures. Sure, he let a huge spreadsheet lead fritter away and then proceeded to lose the productivity suite wars to Microsoft Corp.

But he was successful in turning Lotus on its head, replacing lost application revenue with business from a strong line of communications products. Perhaps Manzi's biggest coup was getting all the world's major telephone companies to throw Notes up on their data nets.

In fact, Notes is the main reason IBM paid so much for Lotus.

But in the late '80s, it seemed Manzi could do no right. Users and analysts considered Lotus arrogant, in large measure because they believed Lotus executives ignored customers.

During that time, Manzi was roughed up regularly for product delays and for not embracing new platforms such as Windows.

In fact, *Boston Globe* columnist Alex Beam wrote a piece in 1988 titled "The Fish Rots at the Head" arguing that Lotus was suffering greatly under Manzi. For a time, Lotus refused to talk to the *Globe*, a decision Manzi ended up making several times.

Notes changed all that. By 1993, *BusinessWeek* was calling Manzi "Software's Comeback Kid." It was around that time that Manzi, at least in the eyes of the industry, began to mellow. But a mellower Manzi is still an intense, sometimes unforgiving individual. In fact, *The Globe's* Beam regrets his column a bit because, he believes, "Jim Manzi and I will never speak."

Even a grudge like this has a funny side. When a Lotus executive let it slip that Beam was his neighbor, Manzi asked, "Is it possible to napalm just one house?" Beam recalls.

Inside story

Lotus employees have always had mixed feelings about Manzi. Some, particularly top executives who fell victim to his near-constant reorganizations, left the company bitter. Others saw Manzi as an effective champion for Notes who fought for the product even when his key lieutenants opposed it.

And while many insiders felt Manzi was cold and caustic, others saw a charming, warm, family man who cared deeply about employee welfare.

One secretary with 12 years of service will miss him. "He was always sweet," said Mary Perella, who remembers that during a difficult personal spell, Manzi would visit regularly just to see how she was doing.

Manzi initiated on-site day care, created a culture that respected individuality (including benefits for same-sex partners) and created a committee to analyze the quality of life at Lotus.

Man at work

Manzi's work style was unusual. Most days, he came in at the crack of dawn and left as early as possible to spend time with his family. He once blew up when he could not reach a single Lotus employee early one morning.

Maybe now, Manzi can finally sleep in.■

IBM's TWO FOR ONE

Last Friday, IBM announced an office of the president for Lotus under which Lotus technologist Michael Zisman will serve as CEO and marketeer Jeffrey Papows will serve as COO. Robert Weiler, senior VP of sales for Lotus, has resigned.

Manzi-isms

"That's the most appalling thing that's happened to me since I've been at Lotus -- to be selected next to some guy who was quoted as saying 'I really know how to chew ass, and I like it.' It's repulsive."

Commenting about being chosen as one of the toughest bosses in America, 1992

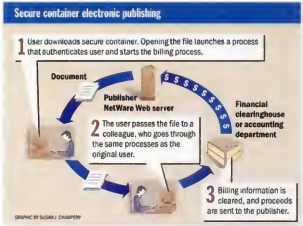
"Software's been berry berry good to me."

Joking that his only hero is a "Saturday Night Live" made-up baseball star named Chico Esquela, 1985.

"I'm always impressed by how many people in the world think it's their job to give me advice."

Reacting to an open letter from pundit Stewart Alsop telling Manzi to resign. Alsop, citing the success of Notes, later took that advice back, 1982.

Secure container electronic publishing



GRAPHIC BY SUSAN J. CHAMPIER

Copyrights

Continued from page 1

ple who crack this [problem] will open the floodgates," he added.

Novell is trying with a version of its Web server that will ship about the middle of next year, said Vic Langford, vice president and general manager of Novell's Internet Commerce Division.

The server will support secure container technology from Sunnyvale, Calif.-based Electronic Publishing Resources, Inc. (EPR), Langford said.

EPR's InterTrust architecture wraps a file in an electronic container that will check a user's identity and right to use a document, and launch a billing process when the user opens the file.

The originator of a file writes rules for its use to protect the copyright and ensure payment, said Victor Shear, EPR's chief executive officer. Redistributors can add to the rules to let them charge extra for the same data.

Users will be able to set up shop on the Web using Novell's server and a version of InterTrust that is integrated with NetWare Directory Services.

But there are no universally accepted clearinghouses that could grant rights and handle financial transactions as a credit card company might. So users would have to establish one-on-one billing relationships with customers.

One possible clearinghouse is the Danvers, Mass.-based Copyright Clearance Center, Inc., a nonprofit company that has for years acted as an intermediary between 9,200 publishers and corporations that want to photocopy and distribute copyrighted information.

Bringing in the big guns

IBM is doing its own thing in secure containers while pushing for standards that would make secure container-based commerce more practical.

IBM executives acknowledged that they are developing secure container technology for infoMarket Search, a software package announced last month. InfoMarket Search lets users search, retrieve and share information from sources including the Internet or legacy databases.

While Big Blue will develop its own secure container technology, it is also encouraging other vendors to develop standards.

"We will work to be interoperable with smaller container vendors, because if all of the secure container vendors don't work together, then users won't buy into any of it," said Jeff Crigler, vice president of infoMarket.■

Secure containers

The problem with most electronic commerce technology is that once a file is sold, the originator loses control over it. One way to address that problem is to add a layer of security to a file that stays with it no matter where it is routed.

While it will be three to five years before the technology is generally available, early versions coming within the next 12 months will give users a peek at a brave new world of publishing in which physical barriers disappear while leaving copyrights intact.

The technology, called a secure container, or cryptographic envelope, not only encrypts files, but it also adds a layer of rules describing how the contents can be used, and by whom. The container, and the rules layer, remain with the file even if it is passed from one user to another; so each new user would have to pay for the rights to view a document that is sold commercially.

Secure containers are vastly different from current security methods, which allow a company to charge for a document once, but do little to prevent customers from redistributing information to colleagues or to their own customers, said Robert Weber, principal of Northeast Consulting Resources, Inc., in Boston.

"I call that the electronic vending machine model," he said.

While the technology is revolutionary, it will not become widespread until interoperability standards have been developed, and standards efforts have barely begun, Weber said.

FCC

Continued from page 10

was considering requiring all holders of toll-free numbers to submit their Standard Industrial Classification (SIC) codes to the nationwide toll-free number sponding 800 number holder. In this way, the database would avoid assigning nearly identical numbers to direct competitors.

Regardless of how the FCC handles vanity numbers, the commissioners also said they were likely to start requiring

Toll-free?

The FCC is considering plans that could cost subscribers money to reserve toll-free numbers:

Proposal
A refundable deposit for each reserved 800 or 888 number.

Options
- Carrier would pay instead of the user.
- Small carriers with fewer than 1% of the toll-free numbers would be exempt.
- Deposit would be forfeited if the carrier or subscriber is found to be hoarding the number.

Proposal
A nonrefundable fee for a right-of-first-refusal for a vanity number.

Options
- Flat fee
- Competitive bidding for the number

database managed by a subsidiary of Bell Communications Research.

Under this scheme, the database would make sure the SIC code of an 888 applicant did not match the SIC code of the corre- escrow deposits for new reservations of all 800 and 888 numbers (see graphic). The proposal is one of several that are designed to minimize widely reported hoarding of toll-free numbers by carriers and users. ■

AT&T gains regulatory parity

As expected, the Federal Communications Commission last week declared AT&T a nondominant carrier, putting it on the same regulatory footing as MCI Communications Corp. and Sprint Corp.

The move means that AT&T, like its competitors, now can change prices on a single day's notice. But in negotiations that continued right up to last Thursday's 5:40 FCC decision, AT&T before Up guarantees that will protect term contracts of large users for the next 12 months.

AT&T officials had labeled the term-contract guarantees a good-faith offering meant to allay customer concerns (*NW*, Oct. 2, page 6) that it would take advantage of its new regulatory freedom. The final agreement appears to split some of the differences.

For example, AT&T originally reserved the right to freeze the terms of Tariff 12 and contract tariff offerings, or alternatively, give users five days' notice to terminate the deals without penalty.

But the Information Technology and Telecommunications Association, Inc. — a user group until recently known as the Tele-Communications Association, Inc. (TCA) — insisted on a 30-day notice period. AT&T and FCC officials decided the notice period will vary between six and 14 days, depending on the change.

And in a key concession demanded by ITTA Washington counsel Jeffrey Linder, AT&T wrote into the agreement that the FCC would retain the right to reject AT&T changes outright for "substantial cause." The FCC has always had this right, but Linder and other user attorneys expressed concern that this unprecedented AT&T agreement could be interpreted as preempting this right.

The final agreement still allows AT&T to change the rates of regular tariffs referenced in term contracts — such as the popular Software-Defined Network calling plan — at will.

But AT&T and FCC officials argued that AT&T's new nondominant status should actually make it easier for AT&T to lower regular rates as well as raise them, because the old requirement that AT&T file rate changes on at least 14 days' notice forced the carrier to telegraph its intentions to competitors.

With AT&T now classified as a nondominant carrier, only the regional Bell operating companies and GTE Telephone Operations fit the dominant carrier description and are subject to stringent tariff filing and price regulations.

Compaq

Continued from page 1

cal conference here. Compaq is expected to detail enhancements to Insight Manager to make it easier to integrate with Hewlett-Packard Co.'s OpenView, IBM's NetView and other platforms. Enhancements may include Remote Monitoring capability, better compliance with the Desktop Management Task Force's Desktop Management Interface and improved Simple Network Management Protocol support, analysts said.

Cluster question

While adding a software layer to enable clustering would be a major boost for Compaq customers, it remains to be seen how closely Compaq servers will actually be able to work, said Steve Kleynhans, an analyst with META Group, Inc. in Toronto. "Clustering is one of those terms that is vague enough that vendors can talk about it freely, because it can mean anything from shared SCSI drives right up to shared memory," he said.

In addition, Compaq will outline its plans to provide customers with a more integrated networking solution by including routing, hubbing and switching in its servers. Compaq this past summer established a relationship with Cisco Systems, Inc. to incorporate Cisco's routing software into Compaq products.

"Efforts in the routing area are just the tip of the iceberg for Compaq," according to Charlie Robbins, vice president of communications research at Aberdeen Group, Inc., a consultancy in Boston. "Hubs and switches definitely fit into [Compaq's] plans because it makes good business sense to offer those capabilities inside servers."

Joe Valente, brand manager for networking products for Texas Instruments, Inc.'s semiconductor division in Dallas, said Compaq has expressed interest in getting further into the networking arena. He said TI currently sells 10Base-T, 100Base-T, 100VG-AnyLAN and token-ring technology to Compaq in the form of chipsets, which the company can use to integrate hubbing, for example, into its server product line.

Valente expects Compaq to build hub cards for its own servers, rather than turn to third parties for that technology.

"They have the expertise on staff to design their own hub cards," he said. "There's no reason in the world that I wouldn't expect to see them do the design themselves and just sell it as an option on their server."

Analysts said Compaq may opt to maximize its relationship with Cisco to provide routing and switching in its servers. ■

Clustering

Continued from page 14

second phase will be multiple server support, intended to provide the level of support in RAID Level 5 configurations, according to Nash. It would provide both multiprocessor support and high-availability backup. Nash declined to give a timeline for either phase of Microsoft's clustering technology.

Participating hardware vendors include AT&T Global Information Systems Co., Compaq Computer Corp., Digital Equipment Corp., Hewlett-Packard Co. and Tandem Computers, Inc.

Ideally, it will be possible to cluster Windows NT systems using a variety of network technologies, according to Glenn Thompson, lead program manager on hardware support and compatibility.

"The interconnections could be standard Ethernet, some emerging technologies such as ATM, or proprietary interconnections such as Tandem's ServerNet," Thompson said. "The infrastructure will allow interconnections with many options, and some OEMs will want to write to some proprietary connections."

Microsoft is developing a clustering API that will enable any application that supports the API to take advantage of clustering.

MICROSOFT GETS CLUSTERING PLAN TOGETHER

Preliminary
Design review with hardware vendors in mid-1996.

Phase 1
Dual server support for automatic fail-over. (When one system fails it switches to the other.)

Phase 2
Multiple servers for high performance and greater availability.

Windows NT will require some modification to support clustering, too. Nash said it is unlikely the clustering will be available in the next release of Windows NT.

Microsoft's ventures into the enterprise network arena have been hampered by criticism that it maintains a PC-centric view of the world.

"The mind-share Microsoft owns is the desktop," said Forrest Whitcher, senior engineer with Boston Scientific Corp. in Watertown, Mass. "Enterprise net technological and support needs are different, and Microsoft is learning to adapt." ■

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Back to Reality

Good cryptography is best hope to preserve privacy in a digital world

During the 4th century B.C., an Athenian playwright said there are two things a man cannot hide: that he is drunk and that he is in love. Everything else is fair game for secrecy.

A secret is hidden or unexplained information. Some secrets are known to just one person; others are held by a small circle of confidants. The best-kept secrets are those that keep everyone guessing.

Like O.J.'s. Did he or didn't he? Simpson's jury said no, but since O.J. was not compelled to testify against himself, only he knows what really happened. (Nice try, Tom Brokaw.)

David J. Buerger

Secrets like O.J.'s have a negative connotation. But most secrets are ethically positive. Examples include private experiences that bond you to a spouse or partner, knowledge of an undiscovered gem of a restaurant or an inn, clever software code or a superior manufacturing technique.

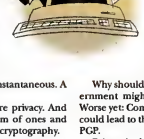
Good secrets can improve relationships, boost the quality of life and put money in your pocket.

Virtue of privacy

Secrecy is just another way to describe privacy, which is a crucial element of personal freedom and attaining a competitive business advantage. Privacy is a long-standing American right, a pillar of our way of life. Eliminate privacy and you erase America.

Preserving privacy is not easy, especially as we plunge into an all-digital networked world.

Individual privacy has been stripped naked by credit bureaus that archive motor vehicle records, auto and property claims on homeowner insurance policies, debt-payment histories, credit databases and, soon, computerized medical patient records — all of which are hawked to authorized bidders.



Having less privacy also plagues businesses. Modern news organizations backed by on-line databases and sophisticated communications technology pin corporations to the mat. Trend analysis, which used to take months or years, is instantaneous. A head start is now good for about a week.

It's no wonder that people want more privacy. And since the world is changing into a realm of ones and zeros, the only way to guarantee privacy is cryptography.

Encryption technology makes plain-text messages and data unreadable to people who are unauthorized to be in on the secret. Public-key encryption allows people to attach digital signatures to encrypted messages and decode them at their destination.

The most popular public-key cryptography uses the RSA algorithm, which comes from RSA Data Security, Inc. in Redwood City, Calif. A common implementation is Phil Zimmerman's Pretty Good Privacy (PGP) program.

Phil is in hot water with the U.S. government. That's because it's illegal to export PGP to any country except Canada. Phil says he did not export PGP, but copies somehow got out — all over the world. Good secrets are hard to keep.

PGP and other programs like it are viewed as munitions by Uncle Sam. The cryptography is so good that kids in the National Security Agency (which stands for "No Such Agency") break into a cold sweat trying to crack codes.

And that's the nub. NSA, CIA, FBI, DEA and every other three-letter acronym in D.C. can't stand Joe and Suzy America having secrets. Put another way, government "powercrats" do not like to lose control.

In its defense, the government has trotted out the standard litany of excuses — like national security and preventing terrorism — for limiting use of powerful cryptography.

National security is a good one. We hear it all the time, such as when Eisenhower justified lying about the U-2 incident, when Johnson lied about the "Battle" of Tonkin Gulf and Nixon lied about the Pentagon Papers and Watergate.

The terrorism appeal falls into the same category. Should Ryder stop renting trucks because someone filled one with explosives and killed innocent people? Should builders construct walls with FBI microphones because criminals meet in private rooms to plot crimes? Should phone companies bug every line to catch mischief in action? Don't laugh — that's the practical intent of the digital telephony law.

Stripping U.S. citizens of their privacy in the name of law enforcement does not wash. There is not enough crime to justify this tack. This will cripple America, not stop crime.

Uncle Sam wanted to be escrow holder of all cryptography keys. Now it proposes a compromise: letting commercial organizations be the bank. Forget it.

Why should anyone escrow keys just because the government might want to tap into somebody's secret? Worse yet: Commercial key escrow is a Trojan horse that could lead to the banning of nonescrow schemes such as PGP.

Privacy in the digital world depends on good cryptography. We need more of it — everywhere. Export limitations should be stopped. Powerful encryption should be built into every application.

People should be able to use any encryption technology they want with whomever they desire to preserve secrets and privacy.

Buerger is an Atlanta-based writer and industry consultant. He can be reached at dbuerger@pipeline.com.

ABEND

abend *(n)* **1:** abnormal end to a computer process **2:** the column that spares no expense to bring you the insights of Internet users and other high-tech wits

Programming codes we could really use

(WOB-L, the Banyan users' important mailing list)

DCBP: Detonate Chair on Bad Password
DPC: Double Precision Crash
EF: Emulate Fireworks
EOS: Erase Operating System
FSE: Fake Serious Error
GME: Generate Meaningless Error
HAL: Murder Operator
HCF: Halt and Catch Fire
IBLU: Ignore Basic Laws of Universe
IML: Invoke Murphy's Law
JUM: Jeer at User's Mistake
KFP: Kindle Fire in Printer
OI: Vey
SARTRE: (Statement has no purpose)
SD: Self Destruct
SSAN: Stop, and See if Anyone Notices

Huh?

The following is, verbatim, a message one of our reporters received recently when he asked what a particular vendor does:

"In summary, [the company] is a premier provider of enterprise information exchange solutions to multinational corporations operating over heterogeneous computing environments."

But what about 9-track?

(from the FAQ for alt.collecting.8-track.tapes)

Have you ever wanted to throw your computer out the window or against a wall? Have you ever been confounded by the sheer number and variety of things that can go wrong with your machine? Ever spent hours trying to tell if the problem was in the hardware or the software? If so, you have something in common with the 8-track hobbyist. Imagine a product for which the only manuals available are old and increasingly hard to get. Imagine if every possible technical support person stopped answering the phone years ago. What? You say you don't have to imagine, that I have just described the plight of the computer user as well as the 8-tracker?

My point exactly.

You're finishing a presentation

on Lotus Freelance Graphics,

printing a report on your boss' desk,

and browsing the Internet

all at the same time.

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Is it the espresso or OS/2 Warp Connect?

While OS/2® Warp Connect may not come with a twist of lemon, it can do something that's nothing less than extraordinary.

It will let you access multiple servers on multiple networks at the same time, wherever you might happen to be.

Just make one phone call and enter your password. That's all it takes to connect into Internet, NT,® UNIX®, NetWare®, Windows® for Workgroup and IBM servers. And that's all it takes to share drives and printers, graphics files and databases. Even applications. It's amazing, really.

And because there are separate memory address spaces built in, it's crash-protected. So a problem with one program won't crash everything you're running.

With OS/2 Warp Connect, you can create Person to Person™ connections with up to eight people, whether they're four floors away or four time zones. So you can conference by video. Collaborate by chalkboard. Communicate.

And you can do it all with the speed and reliability of OS/2, the software that readers of *InfoWorld* voted Product of the Year for three consecutive years. If you're looking for network connectivity, compatibility and true multitasking, you should remember one important thing: It's not only where the working world is headed, it's where it is right now.

Can your software do this?

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